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ABSTRACT

This report describes and evaluates a training program for educational researchers conducted prior to and following the 1969 annual meeting of the American Educational Research Association. The report's description of each of the program's 12 specific training sessions, which served a total of 542 educational researchers, includes the following elements: (1) Session title and staff, (2) general description, (3) objectives, (4) schedule, (5) participant characteristics, (6) instructional and evaluation materials, and (7) evaluation by staff and participants. Training sessions described cover the relationship of the following topics to educational research: (1) Instructional product (materials) development, (2) nonparametric methods and associated post hoc procedures, (3) the computer and natural language, (4) methods for improving children's learning proficiency, (5) systems approach in counseling and counselor education, (6) multivariate design and analysis, (7) anthropological methods, (8) sample free test calibration and person measurement, (9) survey research, (10) multiple group discriminant strategy, (11) Baysian statistical analysis, and (12) design and analysis of comparative experiments. (JH)

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# 1969 AERA RESEARCH TRAINING PROGRAM

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for the

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August 1969

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# ACKNOWLEDGEMENTS

The writer wishes to acknowledge the efforts of the numerous individuals who made possible the conduct of the 1969 AERA Research Training Sessions. Prominent among these, of course, were the directors and the staff members of the training sessions. These individuals devoted far beyond the required energy in order to insure high quality of the training programs. The names of these individuals are cited in the report.

Another group which must be commended is the 1969 AERA Presessions Committee. These persons, also identified later in the report, exercised their responsibilities to make policy decisions and select top caliber training programs in a far more serious manner than one typically expects from such committees. The subsequent evaluations of the training sessions by participants suggest that the committee performed its selection task with considerable skill.

Finally, the central staff of the American Educational Research Association led by Richard A. Dershimer should receive special approbation. In particular, the constant guidance and support of Gary E. Hanna and Michael J. McCormick must be noted. These individuals worked diligently to insure that the training sessions were supported properly, both administratively and financially, at all times.

W. J. P.
August, 1969

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## INTRODUCTION

During February 1 to 5, 1969 the American Educational Research Association (AERA) conducted a program of eight research training presessions prior to the annual meeting of the Association in Los Angeles. Approximately two months later, March 28 to April 1, four research training postsessions were staged by AERA in College Park, Maryland. The combined presessions and postsessions served 542 educational researchers. The costs of the program were borne by AERA, the U.S. Office of Education, and the participants themselves. This report describes the background, selection, planning, conduct, and evaluation of the 1969 AERA Research Training Sessions.

## BACKGROUND OF THE RESEARCH TRAINING SESSIONS

The 1969 presession and postsession programs can trace their origins to informal meetings of one or two days duration involving a relative handful of selected researchers prior to the 1964 and 1965 annual AERA meetings. The 1964 and 1965 informal meetings were not widely publicized and really did not have the training of researchers as their primary mission. However, they can be regarded as the precursors of the AERA research training sessions since in 1966 the prototypical "presession" was held as one of a group of three meetings in the tradition of these previous preconvention meetings. The 1966 presession which set a pattern, thereafter adopted for the AERA presession programs, was a session dealing with experimental design under the direction of Richard E. Schutz. This 1966 presession on experimental design was the first five-day presession sponsored by AERA and was, in addition, the first formal research training program completed under Title IV of the Elementary and Secondary Education Act of 1965. Further, the session directed by Schutz was the initial presession in connection with a professional meeting that was systematically evaluated[1] with respect to the attainment of its objectives.

Because of the success and acceptance of the 1966 presession on experimental design, coupled with a growing interest of AERA members in the possibility of expanding and formalizing other presession meetings, AERA sponsored a program of six courses in the 1967 presession program under the general chairmanship of Richard E. Schutz. These sessions and their directors were the following:

1. Bayesian Statistical Analysis
   Donald Meyer, Syracuse University

2. Curriculum Research and Evaluation
   Robert L. Baker, Arizona State University
   W. James Popham, University of California, Los Angeles

---

[1] Stake, R. E.; Glass, G. V; and Taylor, P. A. Report of the Evaluation of the AERA 1966 Presession on the Design of Educational Experiments. Center for Instructional Research and Curriculum Evaluation, University of Illinois, 1966. 95 pages (mimeograph).

3. Design and Analysis of Comparative Experiments in Education
   Gene V Glass, University of Illinois.

4. Educational Research Management Procedures
   Desmond Cook, Ohio State University

5. Multivariate Design and Analysis in Educational Research
   Joe Ward, Southwest Educational Development Laboratory

6. Research Strategies with Culturally Deprived Children
   Martin Deutsch, New York University

The 1967 presession program was supported in part by a grant from the U.S. Office of Education under Title IV of ESEA, 1965. Approximately 500 researchers applied for the program and somewhat more than 300 researchers actually participated.

The response to the extended 1967 program was highly positive and led to a much expanded program of eleven presessions in 1968 under the chairmanship of Gene V Glass. The 1968 sessions were the following:

1. Research in Reading Instruction
   John R. Bormuth, University of Chicago

2. Educational Research Management Procedures
   Desmond L. Cook, Ohio State University

3. Anthropological Field Methodology in the Study of Education: With Particular Emphasis on Classroom Behavior and School Administration
   Frank W. Lutz, New York University

4. Nonparametric Methods in Educational Research
   Leonard A. Marascuilo, University of California, Berkeley

5. Design and Analysis of Comparative Experiments
   Jason Millman, Cornell University

6. Evaluation: New Concepts in Scope, Strategy and Purposes
   C. Robert Pace, University of California, Los Angeles

7. The Computer and Natural Language
   Ellis B. Page, University of Connecticut

8. Instructional Product Research
   W. James Popham, University of California, Los Angeles
   Howard Sullivan, Southwest Regional Laboratory for Educational Research and Development

9. On-line Computer Applications in Educational Research
   Ronald G. Ragsdale, Ontario Institute for Studies in Education

10. Multivariate Design and Analysis in Educational Research
    Joe H. Ward, Southwest Educational Development Laboratory

11. Developmental Processes in College Students
    Jonathan R. Warren, Educational Testing Service

The 1968 presessions program was also supported in part by a grant from the U.S. Office of Education under Title IV of ESEA, 1965. Nearly 750 individuals applied for the program and approximately 550 actually participated.

## THE 1969 RESEARCH TRAINING SESSIONS

In the late spring of 1969 AERA president David R. Krathwohl appointed the following Research Training Presessions Committee:

W. James Popham, Chairman
Samuel Goldman, Division A - Administration
Roland Payette, Division B - Curriculum and Objectives
Leonard Marascuilo, Division C - Learning and Instruction
S. David Farr, Division D - Measurement and Research Methodology
Carl Thoresen, Division E - Student Development and Personnel Services
Charles Burgess, Division F - History and Historiography

The Call for Proposals. In April, 1968 the call for 1969 presession proposals was distributed to the membership primarily through an announcement that appeared on the front page of the *Educational Researcher*, the official newsletter of the American Educational Research Association (Number 5, 1968). The text of that call for presession proposals is presented below:

> Potential directors for the 1969 AERA Presessions, to be held on February 1 - 5, 1969, are being sought among the ranks of AERA members. The Presession Committee plans to place a proposal for approximately eight five-day presessions in the hands of a granting agency in July.
>
> Any AERA member interested in proposing and directing an AERA Presession for 1969 should write the presession Committee Chairman, W. James Popham, for a proposal outline. Proposals are expected to be brief (no more than three or four pages) and tentative. There are no restrictions on content; it is hoped that a broad range of topics (nonmethodological as well as methodological) will be proposed. The emphasis in the 1969 presessions will once more be *training*, i.e., providing participants with specific competencies of relevance to their research activities. The deadline for receipt of proposals is July 1, 1968. The Presession Committee will meet shortly thereafter to select those presessions deemed worthy of support.

Request for proposal outlines and inquiries should be addressed to W. James Popham, Graduate School of Education, University of California, Los Angeles, California 90024.

In addition, a somewhat more elaborate three-page duplicated call for presession proposals was mailed individually to approximately 200 leading educational researchers in America.

The Selection of Training Sessions. The Presessions Committee met at O'Hare Airport on Thursday, July 11, 1968. Douglas Penfield substituted for Leonard Marascuilo. All other committee members were present. The principal purpose of the meeting was to select a program of presessions in connection with the 1969 annual meeting. In addition, however, several decisions were made regarding extension of the presession-type program.

The call for presession proposals published in the Educational Researcher plus personal notes from members of the Presessions Committee produced a total of 35 proposals. The titles of these proposals are listed below:

1. Survey Research in Education
2. Research in Instructional Product Development
3. Laboratory Training in Educational Research
4. Applying Research to Innovation in Higher Education
5. Educational Research Management Training Program
6. Language and Linguistics
7. Evaluation: Information for Decision-Making - A Preview of the National Evaluation Study Committee of Phi Delta Kappa
8. Audio-Visual Extensions of Research Techniques
9. Methodological and Theoretical Problems of Research in Lower Income Communities
10. Applied Linguistics in Educational Research
11. Experimental Design in Educational Research
12. Studying College Students
13. Measurement and Evaluation: Test Construction
14. Multiple Group Discriminant Strategy for Multivariate Prediction of Taxonomic Criteria

15. Nonparametric Methods and Associated Post Hoc Procedures in Educational Research

16. Educational Information Handling

17. Bayesian Statistical Analysis

18. Design and Analysis of Comparative Experiments

19. Informal Instruction in Language Arts: A Challenge for Educational Research.

20. Use of Observational Systems

21. The Computer and Natural Language

22. Methods for Multivariate Data Analysis in Education and Psychology: Theory and Applications

23. Training in Research on Elaborative Methods for Improving Learning Proficiency

24. State of the Art of Remote Access Educational Systems

25. Systems Approach in Counseling and Counselor Education

26. Computer Applications to Education

27. Introduction to Fortran IV

28. Does Teacher Training Train Teachers?

29. Fundamentals of Educational Research

30. Proposal Writing Workshop

31. Biological and Social Determinants of Ability

32. Multivariate Design and Analysis in Educational Research

33. Anthropological Methods in Education Research

34. Mathematical Models for Measurement in Educational Research

35. A Technology for Curriculum Development

The meeting commenced with a reaffirmation of the statement of presession purposes which had been approved by the 1968 Presessions Committee. The focus on training or disseminative sessions as opposed to seminal or generative sessions was particularly noted. It was agreed by the Committee that in judging the proposals of peers, since candor was important, any comments of an evaluative nature made during the meeting would be treated with complete confidentiality.

The first substantive decision pertained to the desirability of adding some type of training sessions on the East Coast. It was believed that holding presessions in connection with the 1969 annual meeting in Los Angeles would make it difficult for Easterners, in particular, to attend. Pros and cons regarding the offering of East Coast sessions were deliberated at some length and a decision was finally reached that four sessions should be offered, but that they would follow the regular AERA meeting by a month or more. The decision regarding the designation of which presessions to recommend for the East Coast was delayed until a consideration of the actual proposals.

Turning to the major task of the meeting, that is, the evaluation of proposals, the following ten criteria were used by each evaluator:

Director and Tentative Staff
1. Experience and capability
2. Degree of commitment of tentative staff

Content
3. Importance of topic (need)
4. Appropriateness to presession format

Instructional Objectives
5. Clarity
6. Usefulness of competencies to be promoted

Anticipated Audience
7. Probable size

Tentative Schedule
8. Extent of planning

Proposed Evaluation Activities
9. Extent of planning
10. Comprehensiveness

In addition, each evaluator gave the proposals an overall rating of either:

A--reject
B--accept conditionally
C--accept with recommendations
D--accept unconditionally

All proposals had been previously received by mail, read, and evaluated by each committee member. Using the overall ratings at the outset, several initial rounds of evaluation were used to screen out those proposals considered inappropriate for one reason or another. The proposals surviving the first and subsequent elimination rounds were then discussed at considerable length. After several hours and the use of different ranking schemes, 12 proposals were selected as worthy of support. The titles of the proposals which were selected and the names of the directors are listed below:

1. Research in Instructional Product Development
   Robert L. Baker

2. Nonparametric Methods and Associated Post Hoc Procedures in Educational Research
   Leonard A. Marascuilo

3. The Computer and Natural Language
   Ellis B. Page

4. Research on Methods for Improving Children's Learning Proficiency
   William D. Rohwer, Jr.

5. Systems Approach in Counseling and Counselor Education
   T. Antoinette Ryan

6. Multivariate Design and Analysis in Educational Research
   Joe H. Ward, Jr.

7. Anthropological Methods in Education Research
   Harry F. Wolcott

8. Sample Free Test Calibration and Person Measurement in Educational Research
   Benjamin D. Wright

9. Survey Research in Education
   James G. Anderson

10. Multiple Group Discriminant Strategy
    Paul R. Lohnes

11. Bayesian Statistical Analysis
    Donald L. Meyer

12. Design and Analysis of Comparative Experiments
    Kenneth Hopkins
    Jason Millman

The procedure agreed to at the meeting was that the Committee chairman should contact the 12 directors by phone as soon as possible and inform them of the decision of the Committee. The 23 rejectees were sent airmail letters the following day. A personal letter was sent which described the Committee's decision and the reason(s) for that decision. In addition, the submitter of the proposal was thanked for his expression of interest.

Having previously agreed to offer eight sessions on the West Coast and four on the East Coast, the Committee then reccmmended which sessions would be offered in the East and West. The chairman was given some discretion in modifying these preferences should certain directors be unwilling to hold their sessions in the East.

The meeting was concluded with a discussion of particulars regarding the conduct of the 1969 sessions, call for 1970 proposals, etc. Prominent among those suggestions was the recommendation that an individual be recruited to handle logistical arrangements in Los Angeles for the presessions to be held there. It was also recommended that some kind of participant evaluation be conducted by the Presessions Committee in addition to whatever evaluations the session directors wished to conduct. A draft of an evaluation form was to be prepared by the chairman who would send copies to each member for their modifications and suggestions. These forms were then to be taken to the various presessions by the individual in charge of logistic arrangements and be transmitted directly to the Presessions Committee. Similar arrangements were to be made for evaluations of postsessions. Suggestions were also made regarding presession topics for next year. These suggestions were to be relayed to next year's Presessions Committee chairman.

The 12 session directors then revised their proposals so that they were incorporated into an AERA proposal to the U.S. Office of Education. This proposal was subsequently approved for funding by USOE.

Preparations for the Training Programs. A meeting on October 18 in Chicago was held with all 12 training session directors present. Discussions of the forthcoming pre- and postsessions centered around procedures for processing applications, in addition to a host of other procedural and substantive issues. The initial agreement concerned the method of processing applications. The decision of the group, after considerable deliberation, was to set no deadlines for applications, but to judge applicants in the order in which they were received on the basis of each applicant's qualifications. In essence, the agreement reached was to employ a criterion-referenced rather than a norm-referenced scheme for accepting applicants. The step-by-step procedure for processing applicants to the 1969 training sessions is described below:

## PROCEDURES FOR PROCESSING APPLICANTS TO 1969 AERA TRAINING SESSIONS

1. All applications received by Popham immediately xeroxed and relayed to first choice director.

2. First choice director makes accept or reject decision within two or three days after receiving applications. (The very first few applications which trickle in can be retained somewhat longer.)

   a. If an applicant is accepted, the director (1) sends the acceptance letter to the applicant and (2) adds applicant's name to a list of accepted participants which is sent weekly to Popham.

   b. If rejected, the application form is sent directly to second choice director (or, if no second choice is given, back to Popham).

3. Second choice directors also make accept or reject decisions within two or three days after receiving applications.
    a. If an acceptance is made, acceptance letter is sent by director, and applicant's name is added to list being sent weekly to Popham.
    b. If rejected, return application form to Popham.
4. Letters informing all rejected applicants will be sent by Popham. If certain directors wish to do so, they may send "sorry" letters also, but it is not necessary. Rejectees will be invited to apply to other sessions in which they are interested.
5. Weekly totals of applicants accepted in all of the sessions will be mailed to each director.
6. Directors for whom large numbers of participants present no instructional problem are urged to accept as many qualified applicants as possible.

It was also agreed to have a one page announcement of the training sessions sent to all AERA members as part of a forthcoming mailing from the AERA central office prior to the appearance of the November Educational Researcher (which was to contain the initial call for applicants).

The items required from each director for a final report regarding the training session were also determined. Further, procedures were described whereby anonymous evaluations from participants would be gathered on the final day of each training session. These were to be administered on a single page form by a representative of the Research Training Sessions Committee and returned directly to the chairman of that committee by the individual administering the form. Modifications in the one sheet evaluation form were made as a consequence of suggestions by the session directors.

## THE PRESESSIONS

The eight presessions were held in Los Angeles immediately prior to the annual meeting. A 25 percent random sample of the 384 applicants[2] for these presessions revealed the following information: Eighty-two percent of the applicants were male and 18 percent female. The average age of the applicants was 36.5 years. Geographically, 43 percent of the applicants came from the West Coast (Alaska, Washington, Oregon, California, Nevada, Arizona and Hawaii) while 21 percent were from northeastern states, 17 percent from midwestern states, eight percent from southern states, and three percent from southwestern states. Canada contributed eight percent of the applicants. Of the individuals applying for presessions, 22 percent had attended AERA presessions in previous years.

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[2] This sampling plan was identical to that used in analyzing applicants to the 1968 presessions, Educational Researcher, No. 4, 1969.

As expected, the majority of applicants (69 percent) were employed in college or university positions, while 14 percent were employed in public school systems, nine percent in federal government posts, four percent in state department of education positions, and four percent in other positions.

Fifty-six percent of these applicants possessed the doctorate, while 41 percent held only a master's degree. Three percent of the applicants held neither a master's nor doctoral degree.

The research productivity of the applicants is reflected by an average number of articles published in scholarly journals of 3.8. The applicants had directed funded research projects to the extent of .8 project per applicant.

The actual number of applicants (first choice) and participants in each of the presessions follows:

| Presession | Applicants | Participants |
|---|---|---|
| 1. Research in Instructional Product Development<br>Robert L. Baker | 68 | 54 |
| 2. Nonparametric Methods and Associated Post Hoc Procedures in Educational Research<br>Leonard A. Marascuilo | 42 | 48* |
| 3. The Computer and Natural Language<br>Ellis B. Page | 55 | 51 |
| 4. Research on Methods for Improving Children's Learning Proficiency<br>William D. Rohwer, Jr. | 25 | 18 |
| 5. Systems Approach in Counseling and Counselor Education<br>T. Antoinette Ryan | 31 | 34* |
| 6. Multivariate Design and Analysis in Educational Research<br>Joe H. Ward, Jr. | 67 | 58 |

(Continued)

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*This disparity is accounted for by second-choice applications.

| Presession | Applicants | Participants |
|---|---|---|
| (Continued) | | |
| 7. Anthropological Methods in Education Research<br>Harry F. Wolcott | 45 | 31 |
| 8. Sample Free Test Calibration and Person Measurement in Educational Research<br>Benjamin D. Wright | 51 | 46 |
| Total | 384 | 340 |

## THE POSTSESSIONS

The four postsessions were conducted after the annual meeting of AERA in College Park, Maryland, March 28 to April 1. A 25 percent random sample of the 274 applicants for the postsessions showed that 89 percent were male and 11 percent female. The average age was 35.8 years. Geographically, the greatest percent of applicants came from the northeastern states which contributed 40 percent. Twenty-seven percent came from the upper midwestern states, and 24 percent from the southern states. Canada contributed four percent while the West Coast, southwestern and midwestern states contributed approximately two percent each. Of the applicants for the postsessions, 29 percent had previously attended AERA presessions.

As with the presession applicants, the sample for the postsessions showed the majority of applicants to be employed in colleges or universities (74 percent). Six percent were employed in public school systems, 10 percent in federal government posts, three percent in state department of education positions, and seven percent in other positions.

Seventy-four percent of the applicants possessed the doctorate, 23 percent held the master's degree, and three percent held neither. Information on research productivity revealed that the applicants had an average of 3.8 published articles in scholarly journals, and had directed an average of 1.2 funded research projects.

The actual number of applicants (first-choice) and participants in each of the postsessions follows:

| **Postsession** | **Applicants** | **Participants** |
|---|---|---|
| 1. Survey Research in Education<br>James G. Anderson | 96 | 63 |
| 2. Multiple Group Discriminant Strategy<br>Paul R. Lohnes | 51 | 52 |
| 3. Bayesian Statistical Analysis<br>Donald L. Meyer | 42 | 31 |
| 4. Design and Analysis of Comparative Experiments<br>Kenneth Hopkins<br>Jason Millman | 85 | 56 |
| Total | 274 | 202 |

## ANONYMOUS EVALUATIONS OF THE TRAINING SESSIONS

For the first time in the history of the AERA training sessions a standard evaluation form was administered anonymously at the close of each presession and postsession by representatives of the 1969 AERA Research Training Sessions Committee. These one page evaluations contained the following directions:

> This evaluation form is administered directly by the 1969 AERA Research Training Sessions Committee. Completed forms will be returned directly to the Committee by the person administering this form. After the data have been tabulated, the instructional staff of your session may request a summary. The principal purpose of this form is to assist in the planning of next year's training sessions. Therefore, be completely candid in your responses. Do not sign your name.

The participants' evaluations of each session conclude the individual description of that session in subsequent sections of this report. An examination of those evaluations will indicate that all pre- and postsessions were viewed positively by participants. Administration of the form took only the expected five minutes. However, particularly with the presessions (which were held in several different locations), the individuals administering the forms had to be in several parts of the Los Angeles area within a few hours. As a consequence, less than 100 percent of the participants completed the evaluation forms in some cases - due to conflicts with coffee breaks, early departures, etc.

To provide an overall estimate of the quality of the sessions, as reflected by participants' anonymous evaluations, in Table 1 those responses which pertain to the effectiveness of a session are summarized for presessions, postsessions, and for both combined. The responses are presented in percentage form, following the actual question as it appeared in the evaluation form.

## Table 1

### Percentage Summaries of Participants' Anonymous Evaluations of Presessions, Postsessions, and Both Combined

**Question:** "Please rate the overall quality of instruction in your session."

| | Excellent | Good | Average | Fair | Poor |
|---|---|---|---|---|---|
| Presessions * | 56 | 32 | 6 | 4 | 2 |
| Postsessions # | 45 | 40 | 9 | 3 | 3 |
| Combined ** | 52 | 35 | 7 | 4 | 2 |

**Question:** "Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year?"

| | Yes | No | Uncertain |
|---|---|---|---|
| Presessions * | 87 | 3 | 10 |
| Postsessions # | 94 | 4 | 2 |
| Combined ** | 90 | 3 | 7 |

**Question:** "If you had it to do over again, would you apply for the session which you have just completed?"

| | Yes | No | Uncertain |
|---|---|---|---|
| Presessions * | 87 | 8 | 5 |
| Postsessions # | 81 | 9 | 10 |
| Combined ** | 85 | 8 | 7 |

**Question:** "If a session such as this is held again, would you recommend to others like you that they attend?"

| | Yes | No | Uncertain |
|---|---|---|---|
| Presessions * | 90 | 4 | 6 |
| Postsessions # | 88 | 7 | 5 |
| Combined ** | 89 | 5 | 6 |

* n = 250, # n = 153, ** n = 403.

An examination of these summary percentages reveals a very favorable participant response to the overall program. There appear to be only minor differences in participant responses to the presession programs, as opposed to the postsession programs. It seems that approximately 90 percent of the 250 presession participants and 153 postsession participants who completed the anonymous evaluation form were well satisfied with the programs.

## COST TO PARTICIPANTS

The anonymous form completed by participants on the concluding day of each session also solicited information regarding how much money, both reimbursable and nonreimbursable, the training session had cost the participant. The presession and postsession median figures for both these costs are presented in Table 2.

One should note that in connection with the postsessions a $75 stipend was provided participants, if needed, by the USOE contract funds supporting the sessions. Since the presessions were held in juxtaposition to the annual AERA meeting, a stipend was not considered requisite. Using average estimates of 180 reimbursable dollars and 70 nonreimbursable dollars per presession participant multiplied by 339 participants, one calculates a hard dollar nonfederal contribution of approximately $85,000 for the presessions. For the postsessions, using a $100 reimbursable figure, less the USOE $75 reimbursement - or $25, plus a nonreimbursable estimate of $60, the nonfederal postsession contribution approximates $17,000. The combined total of over $100,000, of course, represents a considerable hard dollar investment on the part of the educational research community in these training efforts. But one must add the soft dollar costs such as those borne by the agencies and institutions which usually permit their professional staff members to avoid regular responsibilities for several days while attending one of these technical refurbishing sessions. Or, to cite another less apparent cost, consider the nonreimbursed time spent by the AERA committees involved in setting up and administering these sessions. When one adds these more elusive costs to the hard dollar estimates, the nonfederal financial contributions to the AERA training sessions are indeed considerable.

Table 2

Median Reimbursable and Nonreimbursable Costs per Participant

| Session | Reimbursable | Nonreimbursable |
|---|---|---|
| Presession I | $197 | $57 |
| Presession II | 217 | 34 |
| Presession III | 210 | 52 |

(Continued)

Table 2

Median Reimbursable and Nonreimbursable Costs per Participant

| Session | Reimbursable | Nonreimbursable |
|---|---|---|
| (Continued) | | |
| Presession IV | $125 | $ 83 |
| Presession V | 134 | 74 |
| Presession VI | 178 | 51 |
| Presession VII | 154 | 123 |
| Presession VIII | 220 | 71 |
| Postsession I | 91 | 72 |
| Postsession II | 99 | 47 |
| Postsession III | 120 | 45 |
| Postsession IV | 101 | 58 |

## PUBLICITY EFFECTIVENESS

As part of the final day's anonymous evaluation forms participants were also asked to indicate where they first learned about the training session they had just completed. These data were needed in order to gauge the effectiveness of the several promotion schemes which were employed by the AERA central office staff and by members of the 1969 Research Training Sessions Committee. In Table 3 results for each session are presented:

Table 3

Participants' Identification of
First Information Source Regarding
The Training Session (In Percentages)

| Session | Educational Researcher | Professional Journal | One Page AERA Announcement | Other |
|---|---|---|---|---|
| Presession I | 71 | 7 | 4 | 18 |
| Presession II | 76 | 4 | 0 | 20 |
| Presession III | 46 | 18 | 7 | 28 |
| Presession IV | 64 | 14 | 7 | 14 |
| Presession V | 33 | 13 | 13 | 40 |
| Presession VI | 75 | 4 | 5 | 16 |
| Presession VII | 70 | 4 | 11 | 15 |
| Presession VIII | 62 | 0 | 8 | 30 |
| (Continued) | | | | |

## Table 3

### Participants' Identification of First Information Source Regarding The Training Session (In Percentages)

| Session | Educational Researcher | Professional Journal | One Page AERA Announcement | Other |
|---|---|---|---|---|
| (Continued) | | | | |
| Postsession I | 69 | 11 | 9 | 11 |
| Postsession II | 76 | 3 | 14 | 7 |
| Postsession III | 70 | 0 | 19 | 11 |
| Postsession IV | 72 | 4 | 12 | 12 |

The majority of "other" sources included information from colleagues, letters from session directors or staff, and informal newsletters from professional subgroups. It should be noted that information regarding two of the sessions was communicated to a majority of participants by vehicles other than the one page AERA announcement and the *Educational Researcher*. Apparently, for certain sessions diverse promotional schemes can be more effective than the customary channels.

## SUMMARY OF INTRODUCTORY REMARKS

Emerging from a widely voiced need by the educational research community for additional training, the 1969 AERA presessions and postsessions continued the trend established in the mid-sixties for short-term training institutes directed by senior researchers. For the first time a program of postsessions was offered in addition to the customary presessions. In all, the eight presessions and four postsessions attracted 658 applicants, 539 of whom actually participated in the sessions. Both the evaluation data supplied by individual directors (see next section) as well as participants' anonymous responses to a form administered directly by the 1969 AERA Research Training Sessions Committee indicate that the sessions were extremely successful.

In the remainder of this report descriptions of the 12 training sessions are presented with each of the following elements being included:

1. Title
2. Staff
3. General Description
4. Objectives
5. Schedule
6. Participants

7. Instructional and Evaluation Materials
8. Evaluation
    a. Test Results
    b. Director's Evaluation

These descriptions are largely drawn from reports supplied by the directors of the 12 sessions. Minor editing was undertaken to preserve some degree of uniformity in the reports. The final section of each report, that is, the participants' anonymous evaluation of the session, was added to the information supplied by the director.

# TRAINING SESSION DESCRIPTIONS

# PRESESSION I: RESEARCH IN INSTRUCTIONAL PRODUCT DEVELOPMENT

## Staff

| | |
|---|---|
| Robert L. Baker<br>(Director) | Southwest Regional Laboratory for Educational Research and Development |
| Harry Handler | Southwest Regional Laboratory for Educational Research and Development |
| William Hein | Southwest Regional Laboratory for Educational Research and Development |
| W. James Popham | University of California<br>Los Angeles, California |
| | Southwest Regional Laboratory for Educational Research and Development |
| Richard E. Schutz | Southwest Regional Laboratory for Educational Research and Development |

## General Description

The focus of this presession was on the research operations associated with the systematic development of instructional products (i.e., materials). Product research activities at the Southwest Regional Laboratory for Educational Research and Development have led to the preparation of a series of instructional sequences designed to promote the skills necessary to initiate and conduct product research and development.

The presession was not an academic offering as such. Activities were generated around selected SWRL and UCLA developed materials related to seven instructional objectives. Experience with these objectives has demonstrated dramatically that behavioral change within a five-day period may be directional but never complete. In view of the limitations imposed, the general strategy was to give the concepts, issues, and procedures sufficient coverage during the presession to enable the participant to accomplish the stated objectives as a function of real-time practical efforts in his own laboratory.

## Objectives

Participants were to be able to:

Objective 1: Specify in behavioral terms the desired outcomes of an instructional program.

Objective 2: Describe the components of a set of instructional specifications and construct sample specifications related to stated objectives.

Objective 3: Select, describe, and/or construct the components of valid instruments to measure the extent to which the desired outcomes are attained.

Objective 4: Describe a given learning situation in terms of its essential elements and outline effective strategies for developing instructional materials appropriate for defined functions.

Objective 5: Select the most valid and practical experimental design for investigating the specified relationships.

Objective 6: Identify the essential ingredients of a written summary and evaluation of an entire development cycle with a particular product.

## Schedule

The institute scheduled activities from 8:30 a.m. to 11:45 a.m. and 1:15 p.m. to 4:45 p.m. In general, there were three "formal" sessions per day and two "optional" sessions. The evening sessions were always optional and were directed to in-depth treatment of topics in which participants displayed interest.

The instructional program and materials were organized to provide considerable discussion on each topic and objective. The rather heavy reading requirements necessitated strong encouragement that participants schedule regular evening hours for independent study. One session each day was developed to direct instruction and practice on the previously assigned instructional materials. Each session was staffed by more than one instructor; however, one staff member was assigned the principal responsibility for organizing and conducting each session.

### Day I

Session 1: Organization, Pretest
Session 2: Product Development Research
Session 3: Product Development Research
Session 4: Elective Activities, Session Organization
Session 5: Issues in Product Research, Design, and Development

### Day II

Session 1: Instructional Objectives
Session 2: Constructing Objectives and Instructional Specifications
Session 3: Criterion Measures and Instructional Decisions
Session 4: Elective Activity
Session 5: A Further Look at Instructional Objectives

Day III

Session 1: Product Development Strategies and Procedures
Session 2: Product Development Strategies and Procedures
Session 3: Quality Verification Procedures
Session 4: Elective Activity
Session 5: Product Tryout and Revision Strategies

Day IV

Session 1: Management Procedures in Product Development
Session 2: Costing and Program Budgeting Strategies
Session 3: Research Design, and Development Strategies
Session 4: Elective Activity
Session 5: Design Issues

Day V

Session 1: Research in Product Development: A Summary
Session 2: Posttest
Session 3: Session Evaluation
Session 4: Posttest feedback and wrap-up

## Participants

Approximately two-thirds of the 54 participants were from college or university staffs. Less than one-fifth were from the public schools. As a group they represented a sophisticated professional education level, having published an average of seven journal articles. Sixty percent of the participants had at least one funded project for which they were responsible. Sixty-three percent of the participants possessed a doctorate.

Sixty-nine percent of the participants were male and 31 percent female. The group's average age was 38 years.

## Materials

In all, 38 documents related to eight content areas were distributed to the participants. The eight content areas were as follows: (1) Specification of Outcomes, (2) Instructional Specifications, (3) Measurement of Outcomes, (4) Development of Instructional Materials, (5) Research Designs, (6) Product Development Management, (7) Program Costing and Budgeting, and (8) Educational Research and Development.

Thirteen of the documents were "self-contained" instructional sequences which the participants worked through during non-scheduled class hours. An attempt was made to provide maximum cues to the participants for use of the materials when they returned to their respective home bases.

## Evaluation

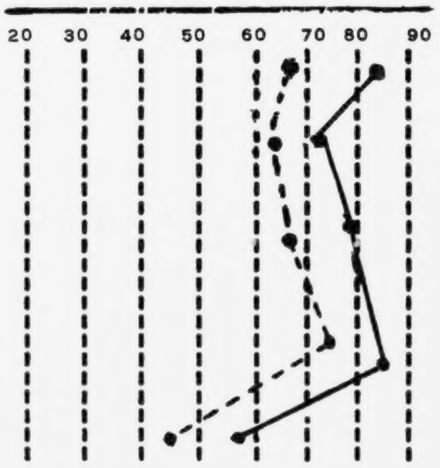
**Test Results.** The primary sources used to evaluate the presession were the pre- and post-instructional performances of the participants on the instructional objectives. The two tests used were neither parallel nor equivalent. The pretest had only 67 items; the posttest had 115. An attempt was made to sample from the same domain for both tests. To avoid pretest "frustrations," part of the sampling rationale for the posttest was to include the more difficult items which participants would probably not be able to respond to at the outset of instruction. Although this makes direct comparisions somewhat questionable, differences obtained would be biased toward the lower bounds.

Table 4 shows the Group Profile of median scores for the pretest and posttest, by objective.

Table 4

*Group Profile: Median Scores (percentage) for Pre- and Posttest, by Objective.

| Objective | Content | Percentage |  | Percent Correct |
|---|---|---|---|---|
|  |  | Pre | Post |  |
| 1 | Behavioral Objectives | 69 | 81 |  |
| 2 | Instructional Specifications | 64 | 72 |  |
| 3 | Selection of Criterion Tests | 69 | 78 |  |
| 4 | Developing Materials | 76 | 84 |  |
| 5 | Design/Evaluation | 46 | 59 |  |



*Dotted line related to pretest results; solid relates to posttest results.

Obviously, the "gains" on the posttest were modest. Two things contributed to this. One, the posttest was a more difficult test than the pretest. Two, the heavy reading load with little "teeth" in the mastery-level monitoring led to insufficient control over concept development. During the five-day period much emphasis was placed on the participant monitoring his own progress and determining the functional utility of the compendium of material for his own professional situation.

Following the presession two additional instruments were used to help evaluate the overall effectiveness and acceptance of the presession. The first of these was the AERA 1969 Research Training Sessions Participant Evaluation Form administered by the AERA central headquarters staff. The form was administered with complete anonymity of the responder. If we can accept such a self-report of global presession characteristics as at least partial evidence of success, the results (reported later) definitely suggested that there was "customer acceptance."

In addition, a 55 forced choice dyad device was constructed to determine priorities as established by the participants. They were asked to rate the topics in each of the 55 dyads in terms of their comparative importance to them. Table 5 includes a summary of the results. Since each of the topic areas was paired once with every other topic and thus was included in 11 dyads, the percentage of times each was selected refers to the base-eleven. The results indicate that Evaluation Strategies was perceived as being most important and Program Costing and Budgeting least important. A certain amount of conceptual confusion is evidenced by the fact that although Evaluation Strategies is ranked high, Quality Verification Procedures is very modestly rated.

Table 5

Priorities Questionnaire Results

| *Percentage of Times Selected | Topic Area |
|---|---|
| 69.37 | Evaluation Strategies |
| 63.33 | Developing Instructional Specifications |
| 60.00 | Criterion Test Construction |
| 58.33 | Developing Instructional Materials |
| 57.50 | Constructing Objectives |
| 55.00 | Tryout and Revision Procedures |
| 47.50 | Quality Verification Procedures |
| 44.37 | Defining Treatment Variables |
| 42.08 | Research Design and Statistics |
| 34.37 | Research Management Procedures |
| 18.12 | Program Costing and Budgeting |

*100% would indicate that the topic was the first choice in every dyad in which it appeared.

Director's Evaluation. The overall evaluation of the presession was that it was quite worthwhile. Recognizing that the objectives stated are not amenable to mastery within a five-day period, even when the participating group is homogeneous and "ready," the presession staff was faced with two general alternatives. One, we could have restricted the content and objectives to a manageable five-day program, e.g., constructing objectives and designing instructional specifications. Two, we could have provided a broad survey of the whole of product development, handling the concepts rather academically and at mostly a verbal level. Neither alternative was satisfactory to the staff. Analysis of our clientele suggested that the former was too limiting conceptually and procedurally, while the later did not permit any real focus. Our compromise was based on the assumption that a dependable behavior change was not likely irrespective of which route we took. Our general strategy was predicated on the hope that the participants would continue to develop skills and work with the materials when they returned to their own professional home. The presession curriculum was designed to cover the entire range of content and objectives cited in the introduction. Attention was then directed to helping the participants use the 38 pieces of written materials both as self-contained instructional sequences and as ready references. If we could help them to monitor their own performance in working through the materials in a more natural work setting, the session would be successful. In sum, we wanted concept mastery at the verbal level, at least procedural familiarity at the skill level, and maximum instructional generalizability to their own professional effort at the real-time work level.

Participants' Anonymous Evaluations. On the final day of the session 45 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 44%, Good 51%, Average 0%, Fair 2%, Poor 2%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 93%, No 4%, Uncertain 2%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 84%, No 9%, Uncertain 7%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 89%, No 7%, Uncertain 4%.

## PRESESSION II: NONPARAMETRIC METHODS AND RELATED POST HOC PROCEDURES IN EDUCATIONAL RESEARCH

### Staff

| | |
|---|---|
| Leonard A. Marascuilo<br>(Director) | University of California<br>Berkeley, California |
| Maryellen McSweeney | Michigan State University<br>East Lansing, Michigan |
| Douglas Penfield | University of California<br>Berkeley, California |
| Andrew Porter | Michigan State University<br>East Lansing, Michigan |
| Michael Subkoviak | State University of New York<br>Buffalo, New York |

### General Description

The course content of this session was restricted to nonparametric techniques extensively used in education and the behavioral sciences. The first part of the course emphasized tests designed to handle qualitative variables. The analysis of both large and small samples was discussed. The second part of the course emphasized nonparametric tests based on ranking procedures. Confidence procedures useful in establishing bounds on the parameters upon rejection of the hypothesis under test were discussed in detail. Measures of association for qualitative and ranked variables were touched upon. The primary objective was to assist the participants in applying the techniques of nonparametric statistics to the solution of problems of hypothesis testing and estimation commonly occurring in educational research. To accomplish this goal, the lectures emphasized (1) development of an "intuitive" rationale for the procedures and (2) applying the procedures in many illustrative research contexts. The mathematical development of the various tests discussed were not covered as part of the formal lectures.

This session was open to persons whose responsibilities included the design of educational research studies and the analysis of research data. The course was intended for educational researchers whose primary commitment is to substantive areas other than that of statistics.

### Objectives

The primary objective of the presession was to assist the participants in applying the techniques of nonparametric statistics to the solution of problems of hypothesis testing and estimation commonly occuring in educational research.

Participants, at the close of the session, should have been able to:

Objective 1: Understand the rationale behind the nonparametic tests presented.

Objective 2: Select the "best" nonparametric test for a specific situation.

Objective 3: Perform nonparametric tests on data from educational research.

Objective 4: Conduct post hoc comparisons on hypotheses rejected by nonparametric procedures.

Objective 5: Apply and extend the techniques learned to specific problems in educational research.

Objective 6: Read current literature on nonparametric methods appropriate for research in education.

Objective 7: Direct other researchers in the use of nonparametric statistics.

## Schedule

### Day I

Session 1: Discussion of class objectives and review of classical statistical methods
Session 2: Continuation of review
Session 3: The Binomial and Hypergeometric Distribution
Session 4: Fisher exact test
Session 5: Discussion

### Day II

Session 1: Median test and Chi-square test
Session 2: Extension of the Median test to K samples
Session 3: Post hoc procedures for the Chi-square and Median tests
Session 4: Tests for Independence in Contingency tables
Session 5: Discussion

### Day III

Session 1: Tests of interaction across contingency tables and associated post hoc procedures
Session 2: $X^2$ tests for interaction in multivariable contingency tables
Session 3: The sign test

Session 4: Spearman's rho and the Wilcoxon test for matched pairs
Session 5: Discussion

Day IV

Session 1: Friedman test
Session 2: Post hoc procedures for the Friedman test and Kendall's Coefficient of Concordance
Session 3: Cochran's Q test and associated post hoc procedures
Session 4: Kendall's tau
Session 5: Discussion

Day V

Session 1: Wilcoxon test (Mann-Whitney)
Session 2: Kruskal-Wallis test and associated post hoc procedures
Session 3: Normal scores test
Session 4: Application of the Wilcoxon test to block designs and test on aligned observations
Session 5: Discussion

## Participants

Of the 48 participants admitted to the presession, 34 appeared on the opening date. Thirty remained with the presession throughout its duration. As might have been expected, the bulk of the participants were male, and produced about the same distribution as in the 1968 presession on the same topic: seventy-three percent were male and 27 percent female. Most of the participants were under forty years of age. Fifty-four percent were from a college or university, 23 percent from a research center, and 23 percent from other areas. Most of the participants held professorial positions at their respective teaching institutions. For most of the participants (62 percent), this was a first exposure to AERA presessions. Seventy-nine percent held a doctorate, and more than 40 percent had at least one article accepted for publication in a refereed journal. The average number of funded research projects directed by each participant was 1.2.

Approximately 28 percent of the applicants were from the West. The very large number of non-show individuals were from the East and Middle West. Most did not attend because of financial cuts and the shortage of travel funds.

## Materials

East staff member prepared detailed lectures. These lectures were presented and given to the students. Participants could refer to the printed materials as the instructor lectured and, therefore, did not have to write notes or copy from the board.

The first part of the course consisted of a review of the basic parametric tests generally discussed in a two-quarter or two-semester course on statistics. A printed review of this material was mailed to participants a month prior to the time of the presession. The second part of the course treated nonparametric tests designed for qualitative variables, and the third part of the course emphasized nonparametric tests based upon ranking procedures. The mathematical development and proving of theorems and related results appeared in the handout materials. The prepared handouts accompanied each lecture. Related readings were assigned in the text Distribution-Free Statistical Tests by James V. Bradley, WADD Technical Report, 60-661 (Office of Technical Services, U.S. Department of Commerce, Washington, D.C.).

## Evaluation

Test Results. Each student was given five multiple-choice tests containing very difficult items. The statistics for the first three tests are as follows:

| Test | Median No. Correct | Maximum Score Possible |
|---|---|---|
| One | 7 | 10 |
| Two | 15 | 20 |
| Three | 10 | 20 |

The low scores on the test were not unusual nor were they unexpected by the staff. While knowledge of the binomial and hypergeometric distributions is essential to the use of many nonparametric methods, it turned out that most participants had only superficial knowledge of these important statistical distributions. Another weakness noted by the staff was the relatively poor training that students in schools of education obtain concerning the importance of confidence intervals. It seems that most instructors of statistics overemphasize the testing of null hypotheses and ignore the more important procedures associated with confidence intervals and their use for making statistical inferences. Since the presession emphasized the use of simultaneous multiple confidence interval procedures, almost all of the material presented to the participants was new.

Director's Evaluation. The presession on Nonparametric Methods and Associated Post Hoc Procedures was held at the Marina Del Rey Hotel on the five days just prior to the 1969 AERA Convention in Los Angeles. While most of the participants were unprepared for the course planned by the instructional staff, the number of new ideas and the intellectual growth that took place in the participants clearly shows that the presession was successful. In fact, the staff believes it was more successful than the 1968 presentation. While the presession did not satisfy all of its originally stated objectives, it did open new vistas and new ways of looking at data collected in educational settings. The value in conducting this presession will be measured in the payoff to education. Both the staff and the participants expect this payoff to be large.

Participants' Anonymous Evaluations. On the final day of the session 25 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 76%, Good 8%, Average 4%, Fair 8%, Poor 4%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 100%, No 0%, Uncertain 0%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 96%, No 4%, Uncertain 0%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 96%, No 4%, Uncertain 0%.

# PRESESSION III: THE COMPUTER AND NATURAL LANGUAGE

## Staff

| | |
|---|---|
| Ellis B. Page<br>(Director) | University of Connecticut<br>Storrs, Connecticut |
| Dieter H. Paulus<br>(Assistant Director) | University of Connecticut<br>Storrs, Connecticut |
| Harold Borko | University of California<br>Los Angeles, California |
| Carl Helm | City University of New York<br>New York, N.Y. |
| Bruce Fraser | Director of the Lanaguage Research Foundation<br>Cambridge, Massachusetts |
| L. Stephen Coles | Stanford Research Institute<br>Stanford, California |
| John McManus | Southwest Regional Laboratory for Educational Research and Development |

## General Description

Since ancient times, the main line of Western scholarship has centered around the analysis, transformation, and production of written language. Until very recently, however, such fields have lacked the tools and techniques and concepts necessary for large-scale, reliable, and inexpensive analysis of language; and high-level scientific research has, therefore, been nearly impossible. But recent developments in computer science make possible a revolution in verbal scholarship and suggest radical changes in the scope and depth of certain kinds of educational research and practice. The content of the presession was concerned with the techniques and applications of such research. Techniques included certain higher-level language (especially FORTRAN, PL/I, and list-processing languages), syntactical and other analysis, and statistical optimization. Applications will include essay grading, content analysis, decision-making, information retrieval, computer-assisted instruction, research in the humanities and in guidance. There was active involvement with conversational computer terminals.

## Objectives

The eventual outcome expected was that the participants would do research using natural-language analysis, would be able to help researchers in the softer areas perform such analysis, and would teach such research techniques to students and faculty in their own regions and institutions. In this way, an effective and virtually new area of educational research might be opened for active exploration and employment.

The four basic goals of the session were that participants would be able to:

Objective 1: Learn about list processing languages, and to master actual programming techniques, which are especially suited for natural language programming.

Objective 2: Learn strategies of heuristic programming, psychological simulation, semantic memory, and artificial intelligence appropriate for such analysis.

Objective 3: Learn techniques of essay grading by computer, content analysis, and computational linguistics which may illuminate certain educational problems.

Objective 4: Conceive, flow-chart, and partially program some suitable small strategies for possible later incorporation into larger educational researches.

## Schedule

### Day I

Session 1: Introduction; Views of Natural Language: general concepts, statistical approaches, analytical approaches
Session 2: Natural Language Techniques: principles and conveniences, using FORTRAN for natural-language programming, alternative languages
Session 3: Interdisciplinary Structure of the Work: parent societies, publications, major centers and projects
Session 4: Special interest seminars and groups

### Day II

Session 1: Language and Logic
Session 2: Applications to Humanities: categories of measurement, information retrieval, stylistic analysis, comparisons and trends, steps toward criticism, status of the field
Session 3: Special interest seminars and groups
Session 4: Special interest seminars and groups

### Day III

Session 1: Applied Language Analysis: Deterministic Procedures
Session 2: Applied Language Analysis: Statistical Procedures
Session 3: Language Data Structures: Information Retrieval
Session 4: Question Answering and Decision-Making
Session 5: Voluntary workshops or interest groups; Beginning own construction of proposed research in natural language analysis; Working with computer terminals; Reading, etc.

### Day IV

Session 1: Artificial intelligence: search, pattern recognition and relevance to NLA, learning systems and the improvement of analysis, problem-solving and planning, induction and models for future analysis
Session 2: Some Educational Applications: interaction in instruction and guidance, educational languages, use of information retrieval in guidance, computer aided instruction, other applications such as creativity tests
Session 3: Small groups and individual problems; Work with the computer terminals
Session 4: Small group and individual work; Terminal and reading, etc.

### Day V

Session 1: Available Resources and Further Problems: available facilities, "What We Should Be Working On"
Session 2: Summary and Evaluation of the Presession

## Participants

Of the 51 participants 88 percent were male and 12 percent female. Their average age was 31.9. Information from the participants revealed that 50 percent held a doctorate and the average number of research articles accepted in a scholarly journal was 4.7 per participant.

## Materials

The staff of the presession set up a library of 113 volumes and periodicals relating to natural language computing. These materials were available during most of the presession to all participants who were allowed to check them out overnight.

Also, each staff member brought with him a selection of materials to supplement his lectures. These materials served either as explanatory, more detailed materials, or as helpful outlines for the content of particular lectures.

Examples of the types of instruction and evaluation materials used were: Exercise II-A-3, Complete the Following Program (sample program and assignment of string manipulation program written in FORTRAN IV, 1 page); Content Analysis - The General Inquirer (brief outline describing structure and function of the General Inquirer System, 3 pages); ELEVR SCRIPT (script illustrating the ELIZA system, 1 page); Puckett, STUFF (description of and directions for using the STUFF system, 14 pages); Review on Computer Grading of Essays (seven review questions on Project Essay Grade, 2 pages); Instrument I-C (thirty item questionnaire on semantic differential structure, 2 pages); and Quiz on Natural Language Application to Education (twenty item quiz on natural language computing applications to education, 1 page).

## Evaluation

Test Results. Many evaluative devices were designed to serve two relatively distinct purposes. First, the many content mastery tests, designed, administered and scored by the various staff members about the quality of their instruction. These instruments were generally administered immediately following each lecture. In many cases the correct responses to each item were also distributed, so as to provide feedback to the participants.

Another class of instruments was designed to evaluate the presession as a whole. Some of these devices were administered on the first day of the presession as "pretest" instruments. Others, including open-ended questionnaires, were administered and scored after the second complete day of the presession. This was done so that the presession organization and/or procedures could be changed if needed. Finally, instruments were administered at the close of the presession. These were post-tests, corresponding in some cases to the pretests given earlier.

Instrument II-B, Formative Evaluation Questionnaire, was administered twice during the presession. The first administration, after the second day of the meeting, provided information about the general satisfaction of the participants with the way in which the presession was conducted. The second administration, at the end of the presession, yielded similar information for the entire meeting. Results are presented in Table 6. As can be seen by the results reported on the instruments, the participants were quite happy with the way the meeting was conducted. The results of the second administration indicate that this general satisfaction increased throughout the meeting.

## Table 6

### Instrument II-B: Formative Evaluation Questionnaire Results

Key: SA (Strongly Agree), A (Agree), ? (Undecided), D (Disagree), SD (Strongly Disagree), NA (No Answer). Please circle your choices.

| | | Second Day | | | | | | Fifth Day | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SA | A | ? | D | SD | NA | SA | A | ? | D | SD | NA |
| 1. | The objectives of this program were clear to me. | 9 | 17 | 9 | 7 | 0 | 0 | 9 | 22 | 3 | 6 | 1 | 0 |
| 2. | The objectives of this program were not realistic | 1 | 13 | 7 | 15 | 6 | 0 | 0 | 5 | 12 | 16 | 8 | 0 |
| 3. | The participants accepted the purposes of this program. | 4 | 21 | 17 | 0 | 0 | 0 | 8 | 23 | 7 | 3 | 0 | 0 |
| 4. | The objectives of this program were not the same as my objectives. | 0 | 13 | 8 | 15 | 6 | 0 | 5 | 9 | 9 | 14 | 4 | 0 |
| 5. | I have not learned much new. | 2 | 9 | 5 | 15 | 11 | 0 | 1 | 2 | 0 | 22 | 16 | 0 |
| 6. | The material presented seemed valuable to me. | 10 | 20 | 9 | 3 | 0 | 0 | 12 | 25 | 3 | 1 | 0 | 0 |
| 7. | I could have learned as much by reading a book. | 2 | 13 | 7 | 15 | 5 | 0 | 0 | 5 | 4 | 23 | 9 | 0 |
| 8. | Possible solutions to my problems are not being considered. | 2 | 10 | 18 | 7 | 3 | 2 | 2 | 11 | 6 | 18 | 4 | 0 |
| 9. | The information presented was too elementary. | 2 | 6 | 7 | 19 | 6 | 2 | 3 | 3 | 4 | 22 | 8 | 0 |
| 10. | The speakers really know their subjects. | 16 | 25 | 0 | 0 | 0 | 1 | 13 | 25 | 3 | 0 | 0 | 0 |

Formative Evaluation Questionnaire. (Continued)

Key: SA (Strongly Agree), A (Agree), ? (Undecided), D (Disagree), SD (Strongly Disagree), NA (No Answer). Please circle your choices.

| | Second Day | | | | | | Fifth Day | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SA | A | ? | D | SD | NA | SA | A | ? | D | SD | NA |
| 11. I was stimulated to think about the topics presented. | 10 | 30 | 1 | 1 | 0 | 0 | 14 | 26 | 0 | 1 | 0 | 0 |
| 12. We worked together well as a group. | 5 | 13 | 14 | 8 | 2 | 0 | 5 | 26 | 7 | 2 | 1 | 0 |
| 13. The group discussions were excellent. | 0 | 5 | 17 | 17 | 2 | 1 | 3 | 15 | 14 | 8 | 1 | 0 |
| 14. There was little time for informal conversation. | 3 | 13 | 6 | 16 | 2 | 2 | 6 | 6 | 4 | 19 | 6 | 0 |
| 15. I had no opportunity to express my ideas. | 2 | 4 | 9 | 21 | 5 | 1 | 1 | 4 | 4 | 25 | 6 | 0 |
| 16. I really felt a part of this group. | 3 | 19 | 13 | 6 | 1 | 0 | 3 | 20 | 12 | 4 | 2 | 0 |
| 17. My time was well spent. | 6 | 23 | 11 | 1 | 0 | 1 | 11 | 22 | 5 | 2 | 0 | 0 |
| 18. The program met my expectations. | 6 | 17 | 12 | 6 | 0 | 1 | 7 | 21 | 3 | 8 | 0 | 0 |
| 19. Too much time was devoted to trivial matters. | 2 | 9 | 8 | 18 | 3 | 2 | 3 | 9 | 7 | 16 | 5 | 0 |
| 20. The information presented was too advanced. | 0 | 5 | 9 | 21 | 7 | 0 | 0 | 5 | 6 | 21 | 7 | 0 |
| 21. The content was not readily applicable to much research in education. | 2 | 9 | 8 | 16 | 4 | 2 | 0 | 5 | 5 | 20 | 10 | 0 |

Formative Evaluation Questionnaire. (Continued)

Key: SA (Strongly Agree), A (Agree), ? (Undecided), D (Disagree), SD (Strongly Disagree), NA (No Answer). Please circle your choices.

| | Second Day | | | | | | Fifth Day | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SA | A | ? | D | SD | NA | SA | A | ? | D | SD | NA |
| 22. The Assistant was very helpful. | 9 | 18 | 13 | 0 | 0 | 2 | 14 | 18 | 7 | 0 | 1 | 0 |
| 23. Theory was not related to practice. | 0 | 11 | 14 | 11 | 5 | 1 | 1 | 7 | 7 | 24 | 2 | 0 |
| 24. The schedule should have been more flexible. | 4 | 9 | 10 | 17 | 2 | 0 | 7 | 9 | 7 | 13 | 5 | 0 |

The "Participant Evaluation Form," a standard AERA instrument used in previous presessions, was administered only once at the close of the presession. The tabulation of responses again indicated a general satisfaction with the presession. The few responses indicating dissatisfaction generally refer to one or two specific sessions which could have been improved.

In summary, the results obtained by all of these instruments indicate a general professional growth on the part of both the participants and the staff, as well as a general satisfaction with the presession.

Director's Evaluation. This AERA presession "The Computer and Natural Language" is only the second of its kind yet held in educational research. In some ways, therefore, it matched the unusual character of its predecessor the year before: its participants came from a variety of disciplines; there was a general feeling of adventure and excitement and, one might say, a kind of intellectual playfulness in a new study. There was, this year as last, a rather remarkable assembly, in which there was a wide divergence in professional background and in field of application, but often a common focus on natural-language computing. That they could all focus on common concerns showed the universality of certain computer approaches today.

There were a number of qualified professionals in the natural-language field, who for some sessions could easily have traded places with the instructors, and in some cases actually did so. These participants greatly increased the sophistication of some interchanges. But heterogeneity of background is a consideration with almost any such workshop.

In general, the field had grown up somewhat during the preceding 12 months of rapid change, and we tried to reflect that growth in the selection of speakers and topics. More than the former year, we delved into computational linguistics, and lingered somewhat longer over the possibilities of artificial intelligence, trying to make explicit the eventual connection between AI techniques and inferences in natural-language data. And many of the sessions had a somewhat less "experimental" feeling. Most of the instructors had at various times, in the prior year if not before, taught much the same sort of thing in special seminars or professional gatherings.

While the days were often spent in learning particular content, the evenings (after the special sessions in enrichment or background areas) were often spent in spirited discussion of key problems (such as syntactic and semantic approaches, the possibilities of time-sharing, etc.). It was an exhausting time, at least for those of us on the full-time staff, but the total effect apparently justified the exertion.

What of the future? The number of applicants approximately doubled in one year. Instead of being the most maverick and rarely selected, the natural-language session became one of the most widely selected, more than filling its quota. This is one more encouraging sign of growth in the discipline, and of endorsement of the workshop idea. From the staff and participants of this one, some similar sessions should emerge, and if possible should be supported. It is an excellent topic for such sessions, being new and relatively unknown, having high generalizability to a large number of research areas, and being untaught in traditional university programs.

If such workshops are held, a few comments might be helpful. Last year we predicted a drift from FORTRAN to PL/I, but that drift has not been as radical as was then anticipated. To the contrary, FORTRAN has served just as well as last year for a basic illustrative language--perhaps even better, because more programs and conveniences have been developed. But in general, languages seemed less important in the instruction; and the concepts of computing, together with concepts from various disciplines, seemed much more important. In other words, there is some apparent trend from technique to science, making the specific languages less important. This trend may be expected to increase, at least at the top of the profession.

A related shift may have made the computer terminals relatively unimportant. This year as last, after considerable effort, and considerable generosity by IBM, the terminals were installed in two locations: the presession library suite, and the lecture area. But this year both terminals, to our dismay, went virtually unused. We believe this shift represents the increased sophistication of the participants. Another year, if we recruited the same kind of advanced students, we would probably dispense with the terminals altogether (though we would still recommend them for other kinds of groups).

Participants' Anonymous Evaluations. On the final day of the session 28 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow:
(1) Please rate the quality of instruction in your session.

Excellent 36%, Good 54%, Average 10%, Fair 0%, Poor 0%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 93%, No 0%, Uncertain 7%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 89%, No 0%, Uncertain 11%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 96%, No 0%, Uncertain 4%.

# PRESESSION IV: TRAINING IN RESEARCH ON ELABORATIVE METHODS FOR IMPROVING LEARNING PROFICIENCY

## Staff

| | |
|---|---|
| William D. Rohwer, Jr.<br>(Director) | University of California<br>Berkeley, California |
| Joel R. Levin | University of California<br>Berkeley, California |

## General Description

The course focused on the knowledge and skills necessary for conducting experimental research on the problem of improving learning proficiency in a variety of populations through methods of verbal and visual elaboration. The word elaboration denotes on the one hand those learner activities that have been referred to in recent experimental literature as associative strategies, mnemonics, natural language mediators, pictorial mediators, syntactical mediators and verbal organizers; on the other hand it also denotes properties of stimulus materials constructed so as to bear analogous relationships with the aforementioned learner activities. In brief, elaboration refers to the augmentation of elements to be learned in the service of more efficient acquisition.

Given its focus on research training, the course was organized in terms of three major kinds of activities: first, the presentation and discussion of the current status of research and theory on the problem of elaboration; second, demonstrations and practice in the use of methods, materials, and procedures that have been employed in such research; and third, the formulation in research terms of additional questions concerning elaboration and the design of experiments likely to yield answers to those questions.

The content of the course, in terms of topics considered, was: stimulus properties of learning materials, a variety of task variables, subject characteristics as they interact with manipulable elaboration variables, and training variables. In connection with all of these topics, the emphases were on the researchable character of the questions that have been asked, the logic relating method to question, the concrete procedures followed to obtain the sought-after answers, and on the identity of the issues that still remain to be resolved. Emphasis was also given to the implications of research on elaboration for instructional tasks and problems such as that of presenting learning materials, promoting retention and transfer, and the issue of individual differences, in particular, the issue of the culturally disadvantaged.

## Objectives

The objectives of the presession were to encourage research on topics related to elaboration and learning efficiency and to promote the acquisition of skills necessary to do so. By way of accomplishing these goals, the aim was to familiarize students with relevant research and thinking already available, provide examples of formulating research questions and appropriate designs for answering them, provide practice in the use of appropriate materials, equipment and techniques, and to provide an opportunity to formulate an original research question, an attendant design and to select the appropriate materials and techniques for conducting the indicated study. Participants were to be able to:

Objective 1: Accurately report what is presently known and not known about elaboration.

Objective 2: State a research question related to elaboration.

Objective 3: Describe a design appropriate for answering the question.

Objective 4: Select appropriate subject populations, tasks, procedures, materials and equipment for use in the study.

Objective 5: Interpret the results, that is, draw inferences from them, and relate the results to existing data and theory.

## Schedule

Each day was devoted to two major kinds of activity: two lecture-discussion sessions each morning, and a longer, demonstration-practice laboratory session each afternoon. The intent was to provide a view of the material from the vantage point of the experimenter rather than from that of an archival reviewer. By using the term lecture-discussion, we wish to indicate our intent to stimulate questions and discussion of the material presented as it is presented.

Typically, the afternoon sessions began with demonstrations of equipment, materials and procedures by members of the instructional staff. Following these demonstrations, students alternately assumed the roles of subject and experimenter, conducting four experiments, under the supervision of each of the instructors. These miniature experiments were selected for their relevance to the day's lecture-discussion and demonstration.

### Day I

Session 1: Presession objectives, expectations, evaluation, schedule elaboration: definition, history, relevance, theory, methodology, overview of phenomena

Session 2: Stimulus properties and learning efficiency: I. Variations in major modalities, properties of pictorial materials, reference to equipment and tasks

Session 3: Laboratory: Equipment--Demonstrations and preliminary training in use

### Day II

Session 1: Stimulus Properties and learning efficiency: II. Verbal materials
    Single words
    Strings
Session 2: Task variables: I. Paradigms (kinds of tasks) and instructions
Session 3: Laboratory: Samples of all Task Variables

### Day III

Session 1: Task Variables: II. Functions (learning, recall), response modes, feedback
Session 2: Subject variables: I. Age, Sex, I.Q., E
Session 3: Field Trip: PPVT, PA: instructions, action

### Day IV

Session 1: Subject Variables: II. SES, Race, E
Session 2: Training Studies
Session 3: Laboratory: Training techniques and designs

### Day V

Session 1: Sample research proposals with emphasis on training studies
Session 2: Participant questions and evaluation
Session 3: Preparation of proposals and discussion

## Participants

Seventy-two percent of the participants were male and 18 percent female. The average age was 36 years. Those who had previously attended AERA presessions amounted to approximately 14 percent of the group.

The majority of the participants (86 percent) were affiliated with colleges or universities. Seven percent were affiliated with the federal government and the remaining seven percent with other institutions.

Academically, 79 percent possessed the doctorate and 14 percent a master's degree. The group had an average of four articles published in scholarly journals and 2.7 funded research projects.

## Materials

Handouts were prepared for each of the laboratory activities and reference materials were available on all of the topics to be covered.

Students were asked to read one paper in advance of the presession which was distributed by mail.

The materials included lecture and lab outlines, abstracts of experiments, reference lists and others such as basic video and sentence generation instructions. Examples of selected references included were: Jensen, A. R. Rote Learning in Retarded Adults and Normal Children. American J. Ment. Defic., 1965, 69, 828-834; Paivio, A. Abstractness, Imagery, and Meaningfulness in Paired-associate Learning. J. Verb. Learn. Verb. Behavior, 1965, 4, 32-38; and Rohwer, W. D., Jr., and Lynch, S. Retardation, School Strata and Learning Proficiency. Amer. J. Ment. Defic., in press.

## Evaluation

Test Results. The extent to which the objectives were attained was evaluated during the last two sessions of the presession which involved the participants in two activities: preparing a written research proposal for a single experiment, including a statement of the problem and of its significance, a design, an appropriate methodology, and an interpretation of possible outcomes; and an evaluation of the instruction and the instructors provided by the presession.

Results of a questionnaire evaluating the presession are given in Table 7.

Table 7

Results of Evaluation

1. Did the presession fulfill your general expectations for it?
   11 - Yes
   4 - Somewhat
   0 - No

2. In your view what were the two weakest and the two strongest aspects of this presession? (the following responses are the ones which appeared most frequently)

   Weakest:
   - Lab sessions
   - No participant interaction or assessment of participant interests
   - Lack of organization in library and no way to duplicate library materials
   - Variability of group

(Continued)

Results of Evaluation (Continued)

Strongest:
Organization of materials and presentations
Excellent references and materials ("handouts")
Magnificant survey of field
Laboratory sessions

3. Were the lecture-discussion sessions sufficiently well-organized and coordinated with one another?
13 - Yes
1 - Somewhat
1 - No

4. Was the content of the lecture-discussion sessions redundant for you?
1 - Yes
4 - Somewhat
10 - No

5. Was the pace of the lecture-discussion sessions ________________?
1 - Too slow
13 - About right
1 - Too fast

6. Did the laboratory sessions provide opportunities for you to acquire skills and/or information you wanted?
9 - Yes
6 - Some

7. Were the laboratory sessions adequately coordinated with the lecture-discussions?
8 - Yes
6 - Moderately
1 - No

8. Additional comments, suggestions, criticisms, plaudits:
A glossary would have been helpful
Liked informality
Would have liked more participant interaction on research

---

Director's Evaluation. I am both pleased and dissatisfied with the outcome of the session. Let me begin by listing some of the sources of my dissatisfaction:

1. The number of applicants for the session was excessively small.

2. My guess is that roughly one-fourth of those who applied where somehow misled as to the content of the session. This suggests that considerable attention should be given to the phrasing of titles and to the possibility of including some descriptive information on the publicity sheet.

3. The participants were quite heterogeneous with respect to relevant preparation. This heterogeneity had only one really negative consequence for the session--the discussion was usually dominated by those having more sophistication, sometimes to the exclusion of the other participants.

4. With more foresight, we could have facilitated the acquisition of a common terminology among the participants by providing a glossary.

5. More time should have been devoted to joint staff-participant consideration of participant research proposals. The cost of doing this would have been the deletion of some information about previous research. Such a price would have been well-justified in view of the fact that the ability to formulate, evaluate and refine research ideas was the major objective of the session.

6. Finally, a relatively minor point--facilities for duplicating reference materials would have enhanced the session.

In contrast to these matters, I count the following aspects of the session as quite gratifying in view of our purposes and the goals of the participants:

1. In accomplishing the task of making the wide variety of arrangements necessary for our session, the assistance of the AERA staff support person was indispensable.

2. Although economically unsound, the small size of the session was a boon for the kind of participant discussion and staff-participant interaction we wished to foster. Frequently the discussions that arose in connection with the lecture presentations were unusually stimulating.

3. The heterogeneity of the participants had one major salutary effect, namely, that the teaching functions were spread among the participants and not confined to the staff. Furthermore, the varied kinds of expertise represented among the participants augmented the amount of relevant information available in the session over what could have been provided by the staff alone.

4. Although the evaluation sheets indicated that the laboratory sessions were a mixed success, their role in the session was a very important one: they provided an opportunity for the less sophisticated participants to acquire information and skills already possessed by the more sophisticated ones. Thus, to a considerable degree, the use of two contrasting kinds of activities, lecture-discussion and laboratory, provided a solution for some of the problems attendant upon the varied initial skills of the participants.

5. The laboratory session in which young children were brought in to serve as subjects in demonstration experiments was a particularly successful one.

6. The discussion of participant research proposals during the final session were quite fruitful. The group was small enough so that each proposal was heard by and discussed with at least two members of the staff and with other interested participants as well. The proposals themselves were of good quality.

7. Because of our small enrollment, it was possible to accommodate a number of graduate students. My impression is that they gained as much or more from the session as did the postdoctoral participants.

Participants' Anonymous Evaluations. On the final day of the session 14 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 36%, Good 43%, Average 14%, Fair 7%, Poor 0%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again? Yes 50%, No 14%, Uncertain 36%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 71%, No 22%, Uncertain 7%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 71%, No 22%, Uncertain 7%.

# PRESESSION V: SYSTEMS APPROACH IN COUNSELING AND COUNSELOR EDUCATION

## Staff

| | |
|---|---|
| T. Antoinette Ryan<br>(Director) | University of Hawaii<br>Honolulu, Hawaii |
| Harry Anderson | University of Georgia<br>Athens, Georgia |
| Ray E. Hosford | University of Wisconsin<br>Madison, Wisconsin |
| Leonard C. Silvern | Education and Training Consultants, Co. |
| Carl E. Thoresen | Stanford University<br>Stanford, California |

## General Description

This pression in systems research was offered in response to requests from counseling personnel and counselor educators. It was designed as an advanced program focusing on the use of systems research in planning and evaluating counseling and counselor education programs. The program was planned to equip counseling personnel and counselor educators with practical skills and theoretical knowledge essential for implementing systems research at local district, state department or university levels. The course of study dealt with conceptualization of systems research, application of systems research, techniques of systems research, and practical uses of systems research.

## Objectives

The purpose of the presession on systems approach was to achieve improvement and innovation in counseling and counselor education through research. The long-range outcome expected as a result of the training session was initiation of positive change in counseling and counselor education through systems techniques. The overall purpose was implemented via four immediate objectives. Participants would:

Objective 1: Become familiar with concepts and principles of systems research, as revealed by meaningful use of concepts including analysis, synthesis, logistics, simulation, feedback, terminal behaviors, and modelling.

Objective 2: Gain knowledge of applications of systems research, as revealed by designing a closed-loop system with feedback between and within major subsystems, relating parts to wholes, and designing graphic analogs.

Objective 3: Develop skills in applying techniques of systems research, including flow chart symbols (signal path connections, signal path directions, arrowhead formation, arrowhead connections, rectangular blocks, descriptor length, coding by point-numeric, upper case lettering, F, FF, A, error signals), and identification of significant elements.

Objective 4: Develop favorable attitudes toward systems research, as revealed by reactions to concept terms.

Schedule

Day I

Session 1: General Session 1
Overview, Pretest, Systems research in counseling and counselor education

Session 2: Topic 1 - Systems Approach: An Overview
Conceptualization of system in model form, General model of instructional system, operational definitions

Session 3: Model for producing a system model, Systems using feedback

Session 4: Topic 2 - Application of Systems Research
Non-school setting, School setting: Quantitative applications

General Session 2
Introduction of research persons, Task assignment

Day II

Session 1: Topic 3 - Techniques of Systems Research
Defining Behavioral Objectives, Conceptual Analysis and Synthesis Analysis, Synthesis

Session 2: Task assignment, Individual activity: Analysis, Reports, Task groups

Session 3: Operationalizing Strategies, Rules and symbols for flowchart modeling, Task assignment

Session 4: Task assignment: Development of flowchart model, Reports

Day III

Session 1: Topic 4 - Case Studies in Systems Research
Case Study: General Problems, Analysis and synthesis of problem

Session 2: Task group reports, Case Study: Counselor Education System, Modeling and simulating to test model

Session 3: Task group reports

Session 4: Case Study: Counseling and Guidance, Modeling and simulating to test model and solve problems, Informal meeting

Day IV

Session 1: Task group reports

Session 2: Critique of solutions

Session 3: Review of concepts and principles, Systematic counseling
Topic 5 - Application of System Research to Problems Identified by Participants

Session 4: Task group work on problems, Staff and participant meeting

Day V

Session 1: Task force group reports

Session 2: Program evaluation

Session 3: Systems evaluation, Summary and conclusions: A review and preview

## Participants

Thirty-six applicants were accepted for the presession, including 34 regular participants and two alternates. Two of the 34 accepted for regular participation were unable to attend; thus, two alternates were invited to participate, making a total enrollment of 34 trainees.

The participants ranged in age from 22 to 56 years, with a median age of 37 years, and included 33 males and one female. Sixty-two per cent of the participants held the doctorate, while 12 percent were doctoral candidates. The remaining 26 percent held a master's degree. The majority (62 percent) were from colleges or universities. Local school districts were represented by 26 percent of the participants, while three percent were from state department of education, and nine percent from other fields.

## Materials

Advance materials were sent to participants prior to the opening of the training program, to assist participants in acquiring a common background of knowledge relevant to the topic. With the acceptance notice each participant received a syllabus and bibliography along with other forms. Participants were asked to read the text, "Systems

Engineering of Education I: Evolution of Systems Thinking in Education," by L. C. Silvern, before the opening meeting.

The recommended reading included such references as Preparing Instructional Objectives by R. F. Mager, The Systems Approach and Counselor Education: Basic Features and Implications by C. E. Thoresen, and New Look at Education: System Analyses in Our Schools and Colleges by J. Pfeiffer. Other instructional materials included films, slide-tape presentations, and programmed materials.

## Evaluation

Test Results. Two criterion measures were taken at the completion of the five-day training session to determine extent to which immediate objectives had been achieved. A pre- and posttest consisting of six sub-tests was administered to assess participant knowledge of concepts and principles, understanding of application of principles, and skill in using systems techniques. A post-training inventory was administered to determine degree to which feelings about systems concepts were positive. Pretest results identified participants' level of pretraining knowledge of systems research, and served as guide to adjust instructional program in terms of learner characteristics and needs.

Posttest results of the Systems Evaluation sub-tests were analyzed to determine extent to which participants developed knowledge and skills of systems research. The relation between sub-tests and training objectives is shown in Table 8.

Table 8

Relation Between Systems Evaluation Sub-tests and Training Objectives

| Sub-test |  | Training Objective Measured |  |
|---|---|---|---|
| No. | Title | No. | Description |
| 1 | Use of Flowchart symbols | 3 | Use of systems techniques |
| 2 | Application of Principles | 2 | Application of principles |
| 3 | Understanding Concepts | 1 | Understanding concepts |
| 4 | System Complexity | 3 | Use of systems techniques |
| 5 | Element Identification | 3 | Use of systems techniques |
| 6 | System fidelity | 3 | Use of systems techniques |

Acceptable performance criteria were defined for objectives relating to knowledge and skills of systems approach. Sub-test scores constituted acceptable performance criteria for knowledge and skills objectives and percent of participants meeting criterion levels on the posttest are reported in Table 9.

## Table 9

Performance Criteria for Three Training Objectives and
Percent of Participants Meeting Posttest Criterion Levels

| Objective | | Posttest Criterion Levels of Acceptable Performance | | | |
|---|---|---|---|---|---|
| No. | Description | Posttest Number | Possible Score | Criterion Level | % Achieving Criterion Performance |
| 1 | Understanding concepts | (3) | 15 | 12 | 47 |
| 2 | Application of Principles | (2) | 20 | 16 | 100 |
| 3 | Use of techniques | (1) + (5) | 35 | 28 | 82 |
| | Total | | 70 | 56 | 82 |

Sub-tests 4 and 6 of Systems Evaluation Test measured skill in dealing with system complexity, and skill in achieving system fidelity, respectively. Analysis of results of sub-tests 4 and 6 reveal that out of a possible twenty points combined score for the two sub-tests, forty-seven percent of participants reached 80 percent criterion level of 16 or higher.

The System Evaluation instrument was pilot tested on six subjects who had previously completed a five-day training program in designing education and training systems. Mean scores on the six sub-tests obtained on the pilot testing of the instrument and mean scores on posttests of participants in the AERA presession compare as follows:

| Sub-test | Pilot Test | | AERA Presession | |
|---|---|---|---|---|
| | $\bar{X}$ | Possible | $\bar{X}$ | Possible |
| 1 | 16.00 | 20 | 18.47 | 20 |
| 2 | 17.16 | 20 | 19.58 | 20 |
| 3 | 11.33 | 15 | 11.13 | 15 |
| 4 | 7.83 | 10 | 4.64 | 10 |
| 5 | 12.16 | 15 | 10.64 | 15 |
| 6 | 15.83 | 20 | 10.00 | 10 |
| Total | 80.33 | 100 | 74.47 | 90 |

The total possible score for the pilot test differs by ten points from the total possible score for the presession posttest, because of a ten point difference in scoring of Sub-test 6. When scores for Sub-test 6 are eliminated from the totals, the mean total score for the pilot test of 64.50 compares to a mean total score on the presession posttest of 64.47.

Three self-evaluation items were included on the program Inventory, to see how participants felt about the progress they made toward training objectives. Table 10 reports the percent of participants who felt gains in knowledge or increase in skill proficiency resulted from the program.

Table 10

Percent of Participants Who Felt They Reached Four Performance Levels of Training Objectives

| Objective Description | Attainment Level: None | Very Little | Quite A Lot | Great Amount | No Response |
|---|---|---|---|---|---|
| 1. How much new knowledge about systems research do you feel you acquired during this program. | 0 | 6 | 58 | 30 | 6 |
| 2. To what extent do you feel knowledge you had before presession was recognized or reintegrated. | 6 | 14 | 21 | 53 | 6 |
| 3. To what extent do you feel you developed proficiency in using systems techniques. | 0 | 12 | 73 | 9 | 6 |

Results in Table 10 indicate that 88 percent of participants felt the program resulted in their acquisition of new knowledge, and 81 percent felt the program led to proficiency in using systems techniques. Results reported on self-evaluations are supported by comparison of pre- and posttest scores on the criterion test. Out of a total possible score of 90, mean pretest score on the Systems Evaluation Test was 15.12, with variance of 242.28, compared to a posttest mean of 74.47, and variance of 22.14.

Results indicate immediate training objectives concerned with developing participant knowledge and skills in systems research were attained at criterion levels by 82 percent of participants.

Analysis of post-training results on the Systems Evaluation Test revealed that 47 percent of participants reached an 80 percent criterion performance level for acquisition of knowledge about systems research concepts.

Results of Systems Evaluation Test indicate that 100 percent of the participants reached the 80 percent criterion level on test of application of principles of systems research.

Analysis of results revealed that 82 percent of the participants reached the 80 percent criterion level on tests of skill in using systems techniques.

An extensive program evaluation was also made to determine the extent to which various program components contributed to effectiveness of the presession. Data were gathered to evaluate learning activities, instructional materials, lecture content, and program organization.

Director's Evaluation. Results from the post-training criterion tests administered immediately following conclusion of the program indicate that achievement of three of four training objectives reached criterion level. Criteria of acceptable performance were defined for training objectives relating to development of participant knowledge and skills. Eighty-two percent of participants reached criterion levels of performance. Analysis of results revealed that understanding of systems concepts was at a lower level than application of principles or use of techniques. Analysis of responses to the sub-test on Understanding Concepts revealed a general lack of understanding of synthesis and logistics. This problem might have been overcome had more use been made of daily evaluation to identify participant gaps in knowledge in sufficient time to devise learning experiences aimed at bolstering specific weaknesses in concept understanding. This problem also might be tackled through a more rigorous schedule of required reading. Only one reference was required. In participant evaluations of recommended readings no responses were given by over two-thirds of participants for four of five recommended references, suggesting that participants had not implemented the recommendation to study these materials.

The finding that 82 percent of participants reached criterion level of performance in use of systems techniques suggests viability of learning activities designed especially to develop skills in systems research. The task group assignments, in which participants worked as task groups with members of the presession staff assigned to implement instructional role for each group, were designed to provide supervised practice in use of systems techniques. Results from criterion tests suggest this approach has merit for developing skill proficiency. Results from the two sub-tests designed to measure skill in dealing with system complexity and in achieving system fidelity suggest that participants failed to reach a particularly high level of sophistication in these areas. It is hypothesized that performance level is a function of time, and that performance level is a function of time, and that either more attention to pre-program reading or more time allotted to the presession proper might lead to more sophisticated performance on the part of trainees.

It was not expected that a particularly significant impact would be made on fostering of attitudes favorable to systems research, due to the limitations of time. It would be expected that as participants implement systems techniques in connection with their professional role responsibilities, attitudes toward systems concepts would become more favorable.

There was some indication of dissatisfaction with the physical arrangement of the room. However, no comments were given to indicate the focus of this response. The general classroom climate appeared to be conducive for learning, with participants reacting favorably to the extent to which freedom for expression was allowed and opportunity for participants to make new acquaintances was fostered. Interest in the AERA sponsored presessions was strong, with 91 percent expressing the opinion that a presession on systems approach should be offered again, and eighty percent indicating interest in attending a presession next year.

There are indications of ways in which the training program might be improved. However, there is strong support both in results of tests of participant performance related to achievement of immediate training objectives and participant evaluation of program organization and management that the program generally was viable and that attainment of long-range goals, the improvement of counseling and counselor education through research, should be obtained.

Participants' Anonymous Evaluations. On the final day of the session 30 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rank the quality of instruction in your session. Excellent 63%, Good 27%, Average 7%, Fair 3%, Poor 0%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 94%, No 3%, Uncertain 3%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 90%, No 3%, Uncertain 6%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 97%, No 0%, Uncertain 3%.

# PRESESSION VI: MULTIVARIATE DESIGN AND ANALYSIS IN EDUCATIONAL RESEARCH

## Staff

| | |
|---|---|
| Joe H. Ward, Jr.<br>(Director) | Southwest Educational<br>Development Laboratory |
| Robert Bottenberg | Air Force Personnel Research Lab.<br>Lackland Air Force Base, Texas |
| Clyde P. Donahoe | Systems Development Corporation<br>Santa Monica, California |
| Earl Jennings | Computer Assisted Instruction Lab.<br>University of Texas<br>Austin, Texas |

## General Description

This session was designed to develop an appreciation for multiple linear regression as a general approach to the formulation and analysis of research problems. As such, the activities were divided about evenly between lecture-discussion, laboratory exercises related to the objectives listed, and exercises related to appropriate computer operations. The illustrative problems were drawn largely from the behavioral sciences.

Concepts and exercises were introduced systematically as they were required in the logical development of the materials. Participants had direct experience with data processing and computer equipment. Each participant prepared a problem statement which reflects acquisition of concepts and development of the attendant techniques that are useful in conceptualizing research problems.

There are two major reasons for the lack of use of general regression models. First, there have been few attempts by teachers to develop the behaviors in students that are necessary to effectively create models appropriate to the particular problem of interest. Second, many of the models that should be utilized for a particular problem require the use of a computer, but many research workers do not have effective systems for communicating with the computer. These two problems can be alleviated by (1) providing an instructional system that will develop in students the capability of defining regression models appropriate to their problems of interest; and (2) providing computational soft-ware that facilitates the analyses by high-speed computer. This course was designed to assist in both problems.

## Objectives

The primary objective of this session was to assist the participants in developing techniques of formulating research problems for computer analyses so as to make full use of the multiple linear regression approach. Participants were to be able to:

Objective 1: Define vectors that express his conceptualization of a problem.

Objective 2: Formulate models appropriate for his specific problems without conforming to experimental designs for which prescribed computational procedures are available.

Objective 3: Identify vectors that represent information that has been measured on a continuum.

Objective 4: Define vectors so as to express nonlinear and interaction relationships.

Objective 5: Use categorical and continuous vectors in models developed to remove the "contamination" of other factors (logic of convariance analysis).

Objective 6: Apply an unambiguous set of rules to the determination of the appropriate degrees of freedom to be used with the linear regression model.

Objective 7: Cite novel examples of research problems to which linear regression is applicable.

## Schedule

### Day I

Session 1: Background and objectives, Research Analysis Lecture (RAL), Chapter 1 of "Applied Multiple Linear Regression"
Session 2: RAL, Chapter 2 through Section 2.4, Mutually Exclusive Categorical Models
Session 3: RAL, Linear Dependence: definition and examples
Session 4: RAL, Comparison of Assumed and Restricted Models, Computation of the F-Statistic
Session 5: Computer Analysis Lecture (CAL)
Session 6: CAL, Discussion of three Services Card Deck and output, Input three Services Problem with DATRAN, Problem Set 1, Problem Set 2

### Day II

Session 1: RAL - Problems in Ordering and Linearity based on Mutually Exclusive Categorical Models

Session 2: CAL - Preparation of Computer Input for Problems in Ordering and Linearity, Input computer deck
Session 3: Summary of morning, Discuss output
Session 4: RAL - Assumptions of General Linear Model
Session 5: RAL - Assumptions of General Linear Model, Problem Set 3

### Day III

Session 1: RAL - Extensions of 1 - Attribute Problem
Session 2: RAL - 2 - Attribute Problems
Session 3: LAB. Individual work - 2-way analysis - Prepare own models, f-Cards, etc.
Session 4: Further variations on the 2-way analysis

### Day IV

Session 1: RAL Covariance Analysis
Session 2: Covariance Analysis
Session 3: 3 - Factor Interaction
Session 4: RAL - Continue on Covariance Analysis (variations)
Session 5: RAL - 2 Attribute Problem - Linearity assume in both attributes

### Day V

Session 1: RAL - F-Statistic, Orthogonal Decomposition and Least Squares Computation
Session 2: RAL - Additional Application of Regression Models
Session 3: Summary and Evaluation
Session 4: Demonstration of Application of SDC time-sharing computers to Educational Problems. Computer assisted instruction, instructional management, financial management, and other applications.

### Participants

Eighty-six percent of the 58 participants were male, and 14 percent female. They had an average age of 36.8. Approximately 67 percent held a doctorate. Their research productivity was reflected in an average of 3.3 articles published in a scholarly journal. They also had an average of .9 funded research project per participant.

Geographically, the majority of participants (44 percent) came from the Midwest; fifteen percent came from the South; 20 percent from the East Coast; two percent from the West Coast; five percent from the South-west and five percent from the Northwest. Canada contributed seven percent and Australia two percent.

### Materials

Examples of materials distributed were: DATRAN Explanation Sheet, Flow Chart of a Program, Assumptions Underlying Fixed X Model, Control Cards for Quadratical Covariance, and Personnel Research Lab Publications.

### Evaluation

*Test Results*. A result of previous evaluation efforts of the presession was the mailing of the Bottenberg and Ward text, *Multiple Linear Regression*, before the session started. One difficulty with the pre-mailing was that a text couldn't be mailed until a participant was selected; if an application was made late, the text would then consequently be mailed late. However, a pretest showed the following results: When asked, "Did you read it?," eight wrote that they did, seven wrote that they did not, nine wrote that they skimmed it, and 32 failed to make any response. The pretest involved defining three vectors, filling in the appropriate binary coded digits, and finding the error vector.

After a rather liberal grading by one of the staff members, the following distribution of scores was found:

All three correct: 18
two correct: 12
one correct: 15
none correct: 11

A mean of 1.66 was found. The pre-mailing was somewhat less than a howling success. Considered from another vantage point, however, the pre-mailing *was* useful. While a participant may not have read the text, he was at least aware of the direction that the presession might take.

Immediately after the presession had been completed, the participants filled out an evaluation form. Pertinent questions are repeated in Table 11 with totals regarding each question.

Table 11

Participants' Evaluation of Content and Presentation

1. Did the content of the lectures and readings presuppose far more previous training than you had?

   Yes 8, No 34, Occasionally 14

   Should less training in these areas or more have been presupposed?

   Less 8, More 5, Same 29

Table 11 (Continued)

2. To what extent was the content of the lectures and readings relevant to what you hoped to accomplish during the session?

   Favorable response 45, Unfavorable response 0, Neutral 7

3. Were the lectures stimulating and interesting?

   Yes 46, No 0, Usually 7

   Were the lecturers competent to speak on the subject assigned them?

   Yes 55, No 0, Usually 1

   Were the lecturers well prepared?

   Yes 53, No 0, Usually 3

4. Were you disappointed in any way with the group of participants?

   Yes 3, No 50

5. If you had it to do over again would you apply for this presession which you have just completed?

   Yes 54, No 1, Unsure 1

6. If a presession such as this is held again would you recommend to others like you that they attend?

   Yes 54, No 1, Unsure 1

7. Do you anticipate maintaining some sort of contact with at least one of the presession staff?

   Yes 46, No 8, Unsure 2

8. Do you feel that AERA is making an important contribution to education by sponsoring presessions such as this one?

   Yes 56, No 0

9. Do you feel that anything has happened during these five days to make it more likely that you will leave your present position of employment?

   Yes 11, No 44, Unsure 1

10. Is it likely that you will collaborate in research with someone else attending this presession (other than those you already were likely to collaborate with)?

    Yes 20, No 31, Unsure 5

11. Do you feel that the staff should feel that it has accomplished its objectives during this five-day presession?

    Yes 54, No 1, Somewhat 1

Director's Evaluation. The effectiveness of a presession is not necessarily easily measured; the question of the criterion is elusive. What is a presession supposed to do? This can be stated in terms of specific objectives to be accomplished. However, specific objectives over a defined time period may not be as important as other effects, perhaps unknown at the time of a presession. Also a presession can accomplish in rather fine fashion the stated objectives; however, if the staff has so much closure that it is no longer viable, little else but those objectives will ever result. That this staff itself was viable is evidenced by their decision to pre-mail the text. Other suggestions made by participants seem also to have been given consideration. If the advanced session planned for 1970 becomes a reality, the staff will have again shown their ability to accept and act on any suggestions.

It is just as important, if not more important, for the participants themselves to leave the presession without having become closed minded about their approach to research. If the material is as new to the participant as would seem to be indicated by their comments, considerable time will be needed to put the ideas presented in proper perspective. Hopefully, this will contribute to their competencies and practices in educational research.

The chairman of the Research Training Sessions Committee provided overall coordination that facilitated the conduct of the presession. The method of processing the applications worked satisfactorily. It was decided during the presession director's meeting in Chicago that there would be no deadline for applications. I think that it is desirable to have a deadline for the applications. This deadline could be accompanied by a statement that "applications received by the deadline will be given first consideration, however those received after the deadline will be considered if space is available." If the applicants have a deadline they could get firm commitment for their attendance. A deadline would help the presession directors who wish to send materials for advanced study.

There should be consideration given to the values derived from the director's meeting in Chicago in the fall. It might be interesting to try a conference phone call. It is nice to get to meet directors for the first time; however, there should be some way of determining the expected payoff of the gathering. Perhaps there should be a meeting of all new presession directors plus one experienced presession director. I suggest some type of cost-benefit consideration concerning the director's meeting in the fall.

Even though the following comment was made in previous years, it needs repeating. Even though the entire staff enjoys putting on the presession, it is apparent that much more staff time is required in presession planning than is allowed for in the budget. It is fortunate that the employers of the presession staff are willing to provide the staff with the time required to carry out the necessary planning.

The 1969 presession planning not only eliminated the need for most of the key punching required by participants in the 1967 presession, but also eliminated the need for some of the computer runs that were required in the 1968 presession. Approximately one-half of the computer runs were simulated. All of the output that would result from the runs were prepared in advance so that instruction would not have to depend entirely upon computer scheduling. This simulation was also stimulated by the inadequate operating system of the IBM 360 system at System Development Corporation. It would have cost entirely too much money to have actually executed all of the programs of the presession. It turned out that it was most economical to go outside System Development Corporation for computer service, since the required service could be obtained at much less cost. As a result of this partial simulation, it is planned that future presessions will have more than half of the runs simulated. In very short sessions possibly one-hundred percent of the computer runs can be simulated. While it is certainly desirable to have some of the problems actually run during the educational program, it seems that a five-day session is a difficult time span to require computer activity. A session that lasts from one to two weeks would certainly allow sufficient time for running problems on the computer.

The presession can be called "successful" as a result of analysis of the comments supplied at the end of the five days. Most of the comments were quite favorable and many participants had useful suggestions for possible improvement.

The use of transparencies was mentioned as a help for presentations during the presession. It is planned to experiment with a mixture of student listening and writing in future presessions. This year much writing was done by the participants; however, it seems reasonable that some writing alternated with some listening and thinking would be more beneficial.

It seems that our effort to send the major publication in advance of the presession was well received and I am sure we will send advanced materials in future years. This experiment came as a result of previous evaluation comments in which many participants suggested advanced mailing of reading materials.

In 1968, one of the participants returned to his own university to introduce this approach to problem analysis immediately. Within two weeks of the presession he had received some positive feedback from his own students. A second faculty member from the same institution attended the 1969 presession. As a result, plans were made the week following this presession to have a staff member present a two-day course of instruction at the university.

There seems to be much interest at the present time in a second type of instructional program--one for those people who have finished a first presession. There are approximately 160 people who have attended one of the three previous presessions (or its equivalent). Many of these participants would like an intensive study program that would allow them to apply to other problems what they now know.

Participants' Anonymous Evaluations. On the final day of the session 55 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 62%, Good 31%, Average 4%, Fair 4%, Poor 0%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 98%, No 0%, Uncertain 2%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 88%, No 2%, Uncertain 10%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 94%, No 2%, Uncertain 4%.

# PRESESSION VII: ANTHROPOLOGICAL FIELD METHODS IN EDUCATION RESEARCH

## Staff

| | |
|---|---|
| Harry F. Wolcott<br>(Director) | Center for the Advanced Study<br>of Educational Administration<br>Eugene, Oregon |
| Alfred G. Smith | University of Oregon<br>Eugene, Oregon |
| Louis M. Smith | Central Midwestern Regional<br>Educational Laboratory |
| George D. Spindler | Stanford University<br>Stanford, California |
| Louise Spindler | Stanford University<br>Stanford, California |

## General Description

Increasing attention has been shown in recent years in applying the field methods of the cultural anthropologist as a perspective for inquiry into formal educational settings. The purposes of this presession were to investigate the field methods which anthropologists use, to consider the possibilities and limitations of several specific methods and approaches, to be able to engage in a dialogue with people who have used or who would like to use these techniques, and to consider the suitability of such techniques for the specific research interests and competencies of the participants. Content was concerned with such questions as the following: What anthropological field methods are appropriate in educational research? What are the procedures and problems with the specific methods identified? What kind of results have been obtained from such methods? Who is doing or planning such research at present (an information exchange)? How does one "get started" in using this approach?

## Objectives

The major objective of the session was to acquaint participants with a variety of field techniques used by cultural anthropologists, drawing upon *specific* examples of fieldwork in which the contributing staff members had engaged. At the close of the session these objectives should have been attained:

*Objective 1*: To grapple constantly with the problem in fieldwork: What do you look for?

Objective 2: To provide adequate time and opportunities for participants to discuss their specific problems with staff and with each other.

Objective 3: To assess the relevance and limitations of any field study methods introduced, and to identify what constitutes a distinctly anthropological study from a non-anthropological one.

## Schedule

### Day I

Session 1: Planning Conference (Staff Only)
Session 2: Introduction of staff, Introduction of participants: research interests, methodological problems, Staff round-table and orientation for the session, critique of "Some Conceptual Tools" by A. G. Smith

### Day II

Session 1: Micro-ethnography of the classroom: (1) Complexities of an Urban Classroom, (2) Teacher plans and classroom interaction, Panel discussion--A Kwakiutl Village and School, Open discussion
Session 2: Field Studies in psyco-cultural adaptation and cultural transmission. (1) Techniques: Case studies and participant observation, (2) Sources: Fieldwork with American Indians in a German Village and in West Coast schools, Panel discussion

### Day III

Session 1: The case as method in anthropology, Panel discussion--Case Studies in Cultural Anthropology, Case Studies in Education and Culture, Open discussion
Session 2: Field studies in psycho-cultural adaptation and cultural transmission. (1) Techniques: Projective techniques, Rorschach, Instrumental Activities Inventory, Expressive autobiographic interviews

### Day IV

Session 1: Use of video-tapes in training observers, Demonstration and discussion
Session 2: Study of a computer assisted instruction program Appalachia, Panel discussion

## Day V

Symposium: Anthropological studies of the organization and administration of education: Kensington, an innovative elementary school; The ethnography of a principalship; Studies of West Coast Schools, Analysis through communication networks: Communication and Status

### Participants

Averages from 92 percent of the 31 participants revealed the following information. Seventy-one percent were male and 29 percent female. The average age was 36.4 years. Approximately 29 percent of the participants had previously attended AERA presessions.

Seventy-one percent were from a college or university. The public school systems contributed 20 percent of the participants, the federal government two percent and state departments of education two percent.

The majority of the participants (74 percent) held the doctorate, while the remainder held masters degrees. The average number of articles published in a scholarly journal was 2.7 and the average number of funded projects per participant was .9.

### Materials

Instructional and evaluation materials used were: a discussion statement prepared to open the session, bibliographies and discussion materials prepared by staff members for use in specific sessions (e.g., Alfred Smith: Bibliography: "A Few Diverse Guides to People Watching"; programmed sequence of questions, "The Case as Method in Anthropology"), a monograph distributed to all participants, and audio-visual materials. There were also exhibit copies of several books and monographs from three series: *Case Studies in Education and Culture*, *Case Studies in Cultural Anthropology*, *Studies in Anthropological Method*.

### Evaluation

*Test Results*. A "Participant Reaction" form was completed by 28 participants on the last day of the session. Representative responses were as follows:

1. Did the content of this session have direct and immediate application to your own work in the research and practice of education?

   a. *Enthusiastic*: "Yes, I'm particularly interested currently in the influence of the sub-culture of the school on the new teacher and the session has suggested a number of leads regarding appropriate questions to ask and methodologies to apply."

b. Unenthusiastic: "Yes, but very little, far less than I had expected--wished! It tended to be 'old stuff' or 'Mickey Mouse'--very poorly presented in many instances."

2. Can you anticipate any long-range consequences or outcomes for you as a result of your participation in this session?

   a. Enthusiastic: "I've been interested in the anthropological analysis of education for some years and the session has brought the interest to the fore. I'll be catching up with the literature in the field in the immediate future and would like to test some of the ideas I've gleaned in some research I'm currently planning. Also planning to join the AAA and attend the next meeting."

   b. Unenthusiastic: "Only in how to increase the effectiveness of such a workshop in the future."

3. In terms of the entire session, in both its formal and informal aspects, which activities (and/or individuals) were most helpful for your purposes?

   a. Enthusiastic: "Different people were helpful in different ways:
   Spindlers--the theories and designs of anthropological research
   Wolcott--ethics, field work problems
   L. Smith--special help directly applicable to my research
   A. Smith--technology and personal attitudes toward anthropology
   Participants--conceptualization of general and specific ideas."

   b. My favorite: "Chairman was the best I've ever seen."

4. Which activities (and/or individuals) were least helpful for your purposes?

   a. Enthusiastic: "After having attended the session last year, I feel I have to react to the total program this year. The activities and personalities all supported each other. I know it was partly accidental, but the program came off, for me, in a way that was very beneficial--in total."

   b. Unenthusiastic: "1. Much overlap in activities.
   2. Not enough coherence or order.
   3. Too much 'presentation of self' of panel.
   4. Too rigid in their self-interests.
   5. There were few informal aspects--unless it was the coffee break.

6. We might have had materials by other-- not present--anthropologists (or sociologists) to acquaint the group of educators. Why this narrow range of perceptions and operations?"

Director's Evaluation. My feeling is that the session was a splendid one. We seemed to have our share of dippy people, malcontents, and dropouts, but we also had many very bright and deeply interested participants. In general, I think the morale of staff and participants remained very high through the session. In spite of a lack of consensus in the comments of participants, I think the success of the session was due in part to the fact that everyone, staff and participants alike, knew exactly where we were going in terms of the content and organization of the sessions. As director I confess to conducting the sessions with a firm and heavy hand regarding the operation of the meetings. My purpose was to maximize the time available for substantive presentation and discussion.

The staff was superb. They were eminently qualified in presenting the content of the sessions. Prior to the sessions we had identified what contribution each person felt he could best make, and each member had made careful preparation for those sessions in which his role was the instructional one. In addition, all staff were present at all sessions to participate in a continuing dialogue regarding the discussions. Staff made themselves freely available for meeting individually with participants, and participants expressed their appreciation for the whole-hearted extent of staff participation and commitment.

Several "working rules" contributed to the organizational success of this session:

1. Instructional sessions were relatively formal but never lasted over an hour without a change of pace (e.g., discussion, panel reaction) or a break. Formal meeting time was limited to two 3-hour sessions a day, promptly begun and promptly terminated.

2. Arrangements were made to have coffee catered at each session. The arrival of coffee signaled an "instant" break.

3. Thanks particularly to David Boynton of Holt, Rinehart and Winston, as well as to individual staff members. Copies of case studies and other recent printed and mimeographed materials were available and were widely circulated among participants throughout the sessions.

4. Considerable variation was offered in the formal program and in the personalities and commitments of individual staff members.

The extent of correspondence between participants and staff reported since the session suggests that participants may have found more help and common ground with individual staff members than they themselves realized on the last morning of the sessions. One wonders, in reading over their criticisms and suggestions for next year, if there is a distinction between a "training session" and a "workshop" and if that distinction might be a useful one to make very explicitly in these sessions. I was a bit surprised to read suggestions regarding a get-acquainted party, a desire for a "problem-clinic" approach to the sessions, a preference for field-trips, and even the charge that the staff was a closed in-group (due, I imagine, to our practice of holding an evaluation and planning meeting at the close of each day's session). The fact that some people called for more structure while others called for less, that some wanted more topics and some wanted fewer, that some expressed disappointment while others touted it the "best session ever" ought to dissuade any director from trying to satisfy everyone.

The field of anthropology and education is in the process of a fantastic regeneration at the present, yet I do not feel that it is essential that this same session be duplicated next year after being offered two years in a row. I would recommend either a lapse of a year or two or, at the least, a different director and staff representing a somewhat different perspective.

Participants' Anonymous Evaluations. On the final day of the session 27 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 41%, Good 33%, Average 11%, Fair 7%, Poor 7%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 85%, No 4%, Uncertain 11%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 77%, No 19%, Uncertain 4%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 77%, No 0%, Uncertain 23%.

## PRESESSION VIII: SAMPLE FREE TEST CALIBRATION AND PERSON MEASUREMENT IN EDUCATIONAL RESEARCH

### Staff

| | |
|---|---|
| Benjamin Wright<br>(Director) | University of Chicago<br>Chicago, Illinois |
| Clarence Bradford | University of California<br>Los Angeles, California |

### General Description

The topic treated in this presession was mathematical models for objective measurement. Applications in educational research were stressed. A new approach to psychological measurement which achieves an important kind of measurement objectivity was explained and illustrated. Illustrations focused on the dichotomous observations which characterize ordinary item analysis, but generalizations to more complicated observations such as frequencies and polychotomies were discussed. Participants acquired an overview of this approach to measurement including a recognition of the importance of measurement objectivity and an elementary mastery of how logistic models can be used to solve measurement problems. They worked through applications of the method to real data, and applied the method to their own data if they wished. Participants also had a chance to work on measurement problems during the session.

### Objectives

Because of the diversity in interests and mathematical training only a few broadly defined objectives could be specified for the whole group. To expect all participants to follow the mathematical and theoretical aspects of the model was unreasonable. Yet, these aspects of the model could not be omitted. To resolve this the staff presented material encompassing the entire spectrum of relevant topics--measurement theory, mathematical derivations, and applications to data. In this the main objective was to convey an overview of this new approach to measurement including a recognition of the importance of measurement objectivity and an elementary mastery of how logistic models can be used to solve measurement problems. The second objective was for participants to gain an understanding of the potential usefulness and applications of the method to real data.

### Schedule

#### Day I

Session 1: A Theory of Measurement
Session 2: Probability Structure of the Model

Session 3: Measurement Tutorial

Day II

Session 1: Logistic Estimation
Session 2: Mean Value Estimation
Session 3: An Example of Item Analysis
Session 4: Estimation Tutorial

Day III

Session 1: Control of the Model
Session 2: Item Pools and Test Designs
Session 3: Necessity of the Model
Session 4: Control Tutorial

Day IV

Session 1: Problems and Possibilities
Session 2: Objective Measurement in Developmental Studies
Session 3: Programming the Model

Day V

Session 1: Measurement and Objectivity

## Participants

The 46 participants attending the presession represented a wide range of abilities and interests. Thirty were primarily interested in the application of the measurement model to real data. The remaining 16 were not only interested in applications but also in working through the mathematical theory and derivations of the model.

Fourteen states, Puerto Rico and Canada were represented. Over 25 percent of the participants came from the West Coast, and 13 percent from Canada. Nineteen universities and six business and government institutions were represented by participants. Seventeen percent of the participants were from business organizations dealing with testing. Twenty-six percent were associated with research associations and evaluation centers. Three government institutions were represented by participants.

## Materials

Examples of the materials used were: Schmidt, A Theory of Measurement; Keesling, Evaluation of Fit, Control of the Model; Wright, Sample-Free Test Calibration and Person Measurement; Wright, Mean Value Estimation; and others.

## Evaluation

Test Results. Evaluation in such a heterogeneous situation was difficult. To handle the diversity of the group, a dual scheme was adopted. First, general objectives were established by the instructional staff, and three questions were asked to assess the attainment of these objectives. Second, participants were asked to define their own objectives and reasons for attendance and then to assess how well they felt their own goals had been realized during the presession.

Thirty-two participants responded to the three questions asked. (The remaining 14 participants were absent from the meeting in which these questions were asked. Most of these 14 were either working on their own data or involved in a session on computing problems.) The first question, "What new and important idea did you gain from the presession?," dealt primarily with the first objective. The results suggested that all 32 of the participants who responded had gained a general overview and elementary grasp of this new approach to measurement.

The second question, "How will you use the ideas you gained from the presession?," provided insight for both objectives. The responses fell into three categories: teaching, statistical research, and test construction. Twelve and five tenths percent would use the ideas gained in teaching, 37.5 percent in statistical research, 41 percent in test construction, and 9 percent found no use.

The fact that approximately 78 percent of these people intend either to do research on the applicability of this model to different kinds of data or actually to apply the technique in their professional activities as test constructors was very heartening.

Twenty of the participants brought data from their own research to work with. A total of 63 computer runs were made on these data. The progressive application of the model to data by participants suggests that they were able to apply the technique to real data in a rewarding way.

The third question was, "If you were to give a presession on sample-free measurement, what improvements would you make or what would you retain from the present presession?" Approximately 37 percent volunteered comments indicating their satisfaction with the lectures. Sixteen percent expressed their satisfaction with the opportunity provided in the presession for individual assistance.

On the negative side six participants indicated their dissatisfaction with a physical feature of the presession. They didn't like the motel. The lecture room was too small. Two felt that the turn-around-time at the computer was too long. Four felt that more data examples should have been given.

The second evaluation scheme produced similar data. The organization of the presession was such that a wide range of topics was presented so that people could concentrate on any one of these areas or all of them. Thus, one evaluation of the success of the presession would be the degree to which the participants themselves felt they had realized their own objectives. The participants were asked in the beginning of the presession to list their own objective for attending the presession. This was done before the staff presented their proposed objectives. At the end of the week's activities each person was asked to evaluate how well his objectives had been attained. The data are summarized below in Table 12.

Table 12

Participants' Objectives

| Objective | No. of people listing the objective | No. of people feeling they attained their objective |
|---|---|---|
| To get an overview of this new technique for item analysis | 23 | 23 |
| To become acquainted with applying the model to item analysis data | 20 | 19 |
| To study the theory and mathematics of the model | 15 | 15 |
| To study the extension of the model to polychotomous data | 5 | 0* |
| To learn a new theory of measurement | 4 | 3 |
| To study test items for which the model is applicable | 3 | 3 |
| To look at the implications of the model for item pools | 3 | 3 |
| To learn the relationship of this model to other models for item analysis | 2 | 2 |
| To evaluate the robustness of the model | 2 | 2 |

*This topic was not presented.

The objectives listed by the participants provide a range of objectives for such a presession. The frequency distribution supports the flexible organization that was employed. These data suggest that the learning activities provided by the staff were diverse enough to satisfy the participants to a large degree even through the participants themselves represented a heterogeneous group in both interest and abilities.

*Director's Evaluation*. The presession was hard work. The variety of participants required preparation of materials on several levels. To accomplish this we had a series of preliminary working sessions in Chicago to prepare the instructional staff to deal with both naive and sophisticated participants. We also prepared detailed instructional materials to make it easier for participants who wished to become more sophisticated to follow the presentation. Finally, we arranged to have simultaneous sessions at different levels of sophistication. The results of these plans were quite satisfying. Participants were at many levels of interest and sophistication. Nevertheless we were able to provide something useful for each of them.

Our chief problem was obtaining adequate computer services. In spite of extensive preparations in Chicago and Los Angeles, we still were delayed in providing computer output for those twenty participants who brought their own data to analyze. If there was any shortcoming in the presession this was it. Although we did 63 computer runs, that is, an average of more than three for each participant who brought data, still I do not feel satisfied with this aspect. Should we repeat this presession I would invest further efforts toward assuring rapid computer turn-around so that each participant could have four or five rounds of data analysis according to this item analysis model.

One outcome of the presession which was not anticipated and which may testify to its impact was the spontaneous creation of an information center and clearinghouse for this kind of item analysis. Dr. Alexander Even, of the Ontario Institute for Studies in Education, volunteered to be the coordinator and organized a group of participants who wished to communicate through him with each other on problems of measurement and item analysis.

*Participants' Anonymous Evaluations*. On the final day of the session 26 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 88%, Good 12%, Average 0%, Fair 0%, Poor 0%. (2) Leaving aside the quality of instruction for the moment, do you think the *topic* treated in your session should be treated again next year? Yes 85%, No 0%, Uncertain 15%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 100%, No 0%, Uncertain 0%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 100%, No 0%, Uncertain 0%.

# POSTSESSION I: SURVEY RESEARCH IN EDUCATION

## Staff

| | |
|---|---|
| James G. Anderson<br>(Director) | New Mexico State University<br>Las Cruces, New Mexico |
| Harlley E. McKean | New Mexico State University<br>Las Cruces, New Mexico |
| Harry R. Potter | Purdue University<br>Lafayette, Indiana |

## General Description

The postsession was a special training program in survey research techniques aimed at demonstrating the use of the survey as a primary instrument for scientific study in education.

Survey techniques have not been generally applied to the study of education, albeit they have been utilized most effectively by social scientists for more than 25 years. This limited use of survey techniques derives from the circumstance that such techniques have been presented almost entirely as means of collecting descriptive information and little attention has been devoted to the analytical aspects of survey research. Both Trow and Sieber vividly underscore this assertion by quoting texts on educational research which, at best, devote limited space to discussions of the clerical aspects of surveys and pointedly exclude any discussion of the analysis of survey data; at worst, inveigh against using survey methods for causal inferences concerning behavioral phenomena.

This distrust of survey methods is manifest despite the fact that by far the major proportion of empirical generalizations in sociology during the past two decades have been derived from survey studies. One has only to look at Lipset, Trow, and Coleman's study of the adolescent subculture of the high school; and Gross, Ward and McEachern's study of the role of the school superintendent, to appreciate the sophisticated use of survey techniques made possible by developments in sampling theory, interviewing techniques, attitude measurement, multivariate analysis and computer technology.

The program was designed to prepare those who had little or no previous experience with survey research to apply survey methods to problems in education. During the session students were acquainted with recent developments in sampling methods, interviewing techniques, attitude measurement, and multivariate analysis. The application of these research methodologies was illustrated with actual poverty surveys, cross-cultural surveys, and institutional surveys conducted by members of the instructional staff.

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An actual survey of the participants was conducted to permit participants to gain experience in the design of a survey, the collection of data, the creation of scales and indices, and the analysis of survey data.

## Objectives

The program was designed to prepare those who had little or no previous experience with survey research to apply survey methods to problems in education. Participants were to gain experience in the following survey research techniques: (1) the statement of objectives, (2) the construction of simple scales and indices, (3) questionnaire construction, (4) interviewing techniques, (5) data collection, (6) coding, and (7) selected methods of analysis.

## Schedule

### Day I

Session 1: General Introduction, Introduction to Survey Research, Class Questionnaire and Coding of Class Questionnaire
Session 2: Planning Surveys
Session 3: Review of Statistics

### Day II

Session 1: Sampling
Session 2: Sampling
Session 3: Measurement, Guttman Scaling

### Day III

Session 1: Measurement, General; Data Collection
Session 2: Data Analysis I, Data Analysis II
Session 3: Free Time

### Day IV

Session 1: Data Analysis II, Data Analysis III
Session 2: Data Analysis III, Data Analysis IV
Session 3: Data Analysis IV

## Day V

### Session 1: Graphical Displays, Evaluation of Training Session

### Participants

Out of the 103 applicants 63 actually participated in the postsession. The geographical distribution showed 25 percent of the participants from the Northeast, 32 percent from the Middle Atlantic, 17 percent from the Southeast, 20 percent from the Midwest, and 2 percent each from the Southwest, Canada, and Germany.

Information on the participants educational background showed that 67 percent held a doctoral degree. Approximately 24 percent indicated that they had attended a previous AERA presession.

Sixty-two percent were affiliated with a college or university, 13 percent with public school systems, six percent with state departments of education, and two percent with the U.S. Office of Education. Seventeen percent were affiliated with other institutions such as religious organizations and regional laboratories.

### Materials

Each participant was provided with a notebook and a set of Case Studies. For every set of three persons a copy of *Sociological Analysis: An Empirical Approach Through Replication* by Murray A. Strauss and Joel I. Nelson (New York: Harper and Row, 1968) was provided.

Instruction and evaluation were broken down into ten sections. A questionnaire from Murray and Strauss was completed by each participant and coded on the morning of the first day of the training session in order to provide data for the class exercises.

### Evaluation

*Test Results*. Suggestions and comments were solicited from the participants on the morning of the last day of the training session. A categorized summary of these comments is given below.

#### Organization

"It was well-planned and conducted."
"Organization O.K."
"Organization was very good--handout format excellent."
"Gear session to either advanced researchers or beginners."
"Keep whole group instruction to a minimum. Have each instructor conduct sessions in his specialty and arrange a round-robin format. This would make it possible for sessions to be conducted on several levels."

Content

"Sampling--good."
"More on data analysis by omitting the actual calculation of statistics."
"Place more emphasis on the design of survey research, i.e., instrument construction, coding, interview techniques."
"More discussion of statistical power of chi square, etc. This was done on scaling and should surely have been done on the statistics--parametric vs. nonparametric."

Computation

". . . a few calculators would increase efficiency and remove the tedious calculations."
"Computer terminal available for familiarization of what it can do."
"Have desk calculators for tabulation or have this part of operation computerized.

Many class exercises were designed to permit the student to gain actual experience in all aspects of designing, conducting and analyzing the data from social surveys. Furthermore, these exercises permitted the staff to assess whether or not individual participants had mastered a particular research technique (i.e., sampling technique, scaling technique, statistical technique, etc.). A list of these exercises and the proportion of participants who successfully completed each one follows in Table 13.

Table 13

Class Exercises

| SUBJECT | PERCENTAGE COMPLETING EXERCISE |
|---|---|
| PLANNING SURVEYS | 95 |
| SAMPLING | |
| Simple Random Sampling | 100 |
| Cluster Sampling | 100 |
| Stratified Random Sampling** | 25 |
| Simple Random Sampling** | 10 |
| MEASUREMENT | |
| Social Contact Distance Scale | NA# |
| Guttman Scaling | 100 |
| Factor Analysis | NA |

(Continued)

Table 13 (Continued)

| SUBJECT | PERCENTAGE COMPLETING EXERCISE |
|---|---|
| DATA COLLECTION | |
| Sociological Analysis Questionnaire* | 95 |
| Questionnaire Construction | NA |
| Interviewing and Interview Schedule Construction | NA |
| Coding Sociological Analysis Questionnaire* | 95 |
| Coding and Tabulation of Survey Data | NA |
| DATA ANALYSIS I | |
| One Variable: | |
| Use and Computation of Percentages | 100 |
| Use and Computation of Percentages | 100 |
| DATA ANALYSIS II | |
| Relationship Between Two Variables: | |
| The Use of Percentages | 100 |
| The Use of Percentages | 100 |
| The Use of Percentages | NA |
| DATA ANALYSIS III | |
| Relationship Between Two Variables: | |
| Measures of Association | |
| Chi Square | 100 |
| Percentage Difference | NA |
| Gamma | 100 |
| Product Moment Correlation | 100 |
| Partitioning the Degrees of Freedom in Contingency Tables** | 45 |
| Testing for Trends in Contingency Tables** | 35 |
| DATA ANALYSIS IV | |
| Relationships Among Several Variables: | |
| The Use of Percentages | NA |
| The Use of Percentages | 100 |
| Relationships Among Several Variables: | |
| Measures of Association | |
| Gamma | NA |
| Product Moment Coorelation | NA |
| Relationships Among Several Variables: | |
| The Use of Percentages | NA |
| The Analysis of Mean Scores | NA |
| Multiple Regression Analysis | NA |
| | NA |

(Continued)

Table 13 (Continued)

| SUBJECT | PERCENTAGE COMPLETING EXERCISE |
|---|---|
| REVIEW OF ELEMENTARY STATISTICS** | |
| Descriptive Statistics | 50 |
| Random Variables | 50 |
| Hypothesis Testing | 50 |
| Comparing Two Means | 30 |
| The Use of Chi Square | 30 |
| Uses of the _F_ Distribution | 30 |

(**Optional Exercise, #NA: Exercise not assigned.)

__Director's Evaluation__. The large number of applicants for this training session would suggest that many persons involved in teaching and conducting educational research desire an opportunity to learn about survey research methodology, and were not exposed to these techniques during their academic training.

Two-thirds of the participants held the doctorate. The median number of courses in statistics and experimental design completed by these individuals was between three and four. It would appear that most participants followed a traditional academic program in which they were exposed to several courses in statistics and experimental design with little or no exposure to survey research methodology.

The fact that forty persons who registered for the postsession did not actually attend can be attributed to several factors. The first was the long registration period that preceded the postsession. Twenty-three of the 40 notified me of their withdrawal from the session. Reasons given varied from illness and injury to campus insurrection. In general, unexpected circumstances arose between the time when they registered and the end of March that prevented them from attending.

The second factor in my estimation was the confusion that existed regarding the cost to participants and the availability of the stipend. Unfortunately, the literature that the University of Maryland sent to applicants contradicted the statement made on the official application that "neither fees nor tuition is charged for any of the sessions." In contradiction to this statement the $50 "registration fee" charged by the University of Maryland came as quite a surprise and could scarcely be defended as covering meals. Many applicants wrote and called me questioning this when they received the registration forms from Maryland. Moreover, a number of persons refused to send the fee in advance until the availability of the stipend was clarified.

The letter that went out to applicants from the AERA central office less than a week before the postsessions were scheduled to begin, unfortunately, only further confused the matter. As a result I received several very irate letters of cancellation. I believe that at least half of those persons who registered but failed to attend may have done so because of this confusion over the actual costs of attending. In the future I strongly recommend that these matters of "registration fees" and availability of stipends be clarified before any announcement is made regarding the research training sessions.

Aside from the problem concerning fees, the Center of Adult Education at the University of Maryland provided a fine setting for the session. Moreover, the staff of the Center provided excellent support. Having such a University Center handle registration and logistics as well as the availability of AV equipment, duplication facilities, etc., has much to commend it for future research training sessions.

The session itself went quite well, in my estimation. We accomplished a great deal of what we had intended to accomplish. However, several of the participants' suggestions that were outlined earlier are important for future training sessions based on this topic. For example, making available a computer terminal for the session next time would serve to introduce participants to the very important technical aspects of processing survey data. At the same time use of such a terminal would cut down on the tedious and time consuming clerical operations and calculations that are necessary when analyzing data.

Although, we did attempt to differentiate the program to suit the interests and level of participants wherever possible, such differentiation might easily be incorporated into the program and notebook from the very beginning by providing a series of optional and supplementary exercises for participants who wish to pursue special topics and/or more sophisticated research methodologies such as the use of multivariate statistical techniques in the analysis of survey data and a variety of sophisticated scaling techniques such as factor analysis, etc. Additional material on a wider variety of data collection techniques could easily be included in the notebook. In this fashion groups of participants could easily simultaneously work on different exercises aimed at different levels but all related to the same central topic.

In summary, I believe that the Research Training Session on Survey Research proved to be most popular and successful and should be offered again next year. In fact, the 40 persons who applied for this year's session but who did not attend for a variety of reasons may well welcome an opportunity to participate the next time that the topic is offered if their expressions of regret at not being able to attend this year are any indication.

Participants' Anonymous Evaluations. On the final day of the session 48 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 28%, Good 51%, Average 19%, Fair 0%, Poor 2%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 88%, No 6%, Uncertain 6%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 69%, No 12%, Uncertain 19%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 85%, No 11%, Uncertain 4%.

# POSTSESSION II: MULTIPLE GROUP DISCRIMINANT STRATEGY

## Staff

| | |
|---|---|
| Paul R. Lohnes<br>(Director) | State University of New York<br>Buffalo, New York |
| William W. Cooley | University of Pittsburgh<br>Pittsburgh, Pennsylvania |
| Richard Ferguson | University of Pittsburgh<br>Pittsburgh, Pennsylvania |

## General Description

A natural research paradigm for studies of human development is to employ an antecedent personality traits profile as predictor of later adjustment outcomes, where the variety of adjustments is described by a taxonomic variable. Such studies are surveys, in which the life patterns of subjects are observed as they unfold naturally. The MANOVA statistical procedures for analysis of multivariate experiments are less than comprehensive in application to surveys, particularly as MONOVA emphasizes inference rather than description. There is need for substantial improvement in the statistical strategy for implementing the trait-and-factor research paradigm in developmental psychology (D. E. Super, et al., Vocational Development: A Framework for Research, 1957, p. 79). What is needed is a more heuristic strategy than MONOVA; one which induces the shape and details of relationships in the data.

For the past fifteen years a series of approximations has been converging on an adequate solution to the methodological problem of multivariate trait prediction of taxonomic criteria. A group of workers at the Harvard Graduate School of Education has been especially influential in promoting the techniques of multiple group discriminant analysis and classification probabilities (P. J. Rulon, D. V. Tiedeman, M. Tatsuoka, C. Langmuir, Multivariate Statistics for Personnel Classification, 1967). The former technique has proven to be so central to an adequate solution to the problem in the experience of Cooley and Lohnes that they have incorporated its nomenclature in their title for the overall strategy that has evolved (W. W. Cooley and P. R. Lohnes, Predicting Development in Young Adults, 1968).

The elements of the sequence of statistical analyses that Cooley and Lohnes now consider to be the most useful strategy for longitudinal developmental surveys was the focus of this presession. Ten years of personal experience in researching career development, as well as attention to the methodological issues in other research on human development, have contributed to the evolvement of this strategy. The presession was intended to explore the "Why?" of this strategy thoroughly, as well as the "How?" of it. Content was about equally divided between the statistical models themselves and examples of actual research applications. Students were encouraged to discuss their own research experiences and plans in relation to this strategy. Instructors treated this as a fluid rather than a final strategy and urged creative thinking about alternative approaches.

One feature of the presession was that it introduced students to a set of multivariate statistical computer programs in the FORTRAN language which Cooley and Lohnes have recently written as part of the preparation of a second edition of their book (W. W. Cooley and P. R. Lohnes, Multivariate Procedures for the Behavioral Sciences, 1962). Lohnes made these programs available to students who sent a tape to Buffalo. These programs should be of significant assistance to students who want to apply the strategy in their own research.

## Objectives

The objectives of the session were the following:

Objective 1: To promote insight into the epistemological problems of the science of human development.

Objective 2: To promote mastery of a specific strategy of research methodology.

Objective 3: To promote understanding of a specific set of multivariate statistical models.

Objective 4: To promote skill in the use of a specific library of computer programs.

## Schedule

### Day I

Session 1: Epistemological Problems of Research on Human Development
Session 2: Epistemological Problems
Session 3: Overview of a Research Strategy

### Day II

Session 1: Organizing the Predictor Data: Factor Analysis Models
Session 2: Research Examples
Session 3: Research Examples and Alternative Approaches

### Day III

Session 1: Organizing the Criterion Data: Distance Function Models

Session 2: Research Examples
Session 3: Examples and Alternatives

#### Day IV

Session 1: Predicting the Criterion: Multiple Group Discriminant Functions Model
Session 2: Research Examples
Session 3: Examples and Alternatives

#### Day V

Session 1: Evaluating the Obtained Prediction Model: Classification Statistics
Session 2: Research Examples
Session 3: Examples and Alternatives

### Participants

Distribution of participants revealed 90 percent male and 10 percent female and an average age of 35 years. Sixty-five percent of the participants held the doctorate, and 33 percent held a master's degree. Attendance at previous AERA presessions was indicated by 33 percent of the participants. Research productivity of the postsession group was revealed in the averages of three articles published in scholarly journals and .9 funded project per participant.

### Materials

The materials for the postsession included two books by W. W. Cooley and P. R. Lohnes, *Multivariate Procedures for the Behavioral Sciences* (N. Y.: Wiley, 1962), and *Predicting Development in Young Adults* (Palo Alto: American Institutes for Research, 1968). There were approximately three hours of IBM 360 time-sharing computing of multivariate statistics in dialogue mode and approximately three hours of batch-processing mode computing on IBM 7094.

### Evaluation

*Test Results.* Two evaluation procedures were employed. First, the director will keep a log of requests for the computer programs generated by the presession. The person requesting program listings will have to make the effort to send a tape to Buffalo, which will indicate some real interest in the procedures studied. Second, students were strongly urged to forward to the director any research reports and reprints incorporating some or all of the strategy taught in the presession. The director has committed himself to prepare a report on the concrete evidence for such effects over a four-year period.

*Director's Evaluation.* The three instructors agreed that they learned a great deal from the students, and that they will be busy for several years exploring the excellent suggestions made by students for modifications in and supplements to the research strategy covered by the session. The students had studied both texts quite thoroughly and were well-prepared for the session. Most of them turned out to be actively involved in research programs in which they are trying to apply the discriminant research strategy. With few exceptions, the students appeared to be appropriate for the session, participated actively, seemed to be enjoying themselves, and appeared to be learning the research strategy.

Over half of the students brought research data decks to the session, and about two-thirds actually computed analyses during the session. This was one of the big surprises to the instructors, who had invited students to bring data but didn't expect many to do so. Every evening of the session there were vigorous small-group discussions about these actual research computations. The two extensive demonstrations of real-time computing of discriminant analysis via teletype communication with the University of Pennsylvania Computing Center seemed to be of great interest to the students. The provision of these computer experiences seemed to be a major positive value in the program. Both the University of Maryland and the University of Pittsburgh are to be commended for contributing the computer time, and special commendation is due to Richard Ferguson of the instructional staff, who worked far into several nights of the session, making the necessary adjustments to the strange environment of the Maryland Univac.

The training site was ideal, except for the distance to the Computing Center. The living arrangements were also ideal, except for the lack of planning for some socials. With the small effort needed to ease the local transportation problem and to schedule some socials, the Center for Adult Education would be ideal for future sessions. The Center staff was great!

There was no AERA presence to speak of. Another time an effort should be made to get the President of AERA out to greet the troops.

The length-pace trade-off for these sessions needs to be examined. The 4-1/2 days might work better if several evening socials were arranged, but I suspect that 3-1/2 days with evening training sessions might make more sense. There is need to insist that people arrive the night before the first morning session, or else start at 1:00 p.m. the first day. We had a mental fatigue factor set in this time.

Participants' Anonymous Evaluations. On the final day of the session 29 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 31%, Good 38%, Average 17%, Fair 7%, Poor 7%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 90%, No 7%, Uncertain 3%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 80%, No 17%, Uncertain 3%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 83%, No 10%, Uncertain 7%.

# POSTSESSION III: BAYESIAN STATISTICAL ANALYSIS

## Staff

| | |
|---|---|
| Donald L. Meyer<br>(Director) | Syracuse University<br>Syracuse, New York |
| James E. Powers | State University of New York<br>Albany, New York |

## General Description

The general topic was the use of Bayesian methodology in designing and analyzing statistical-type studies. Specific topics included the philosophy and rationale of Bayesian statistics including an introduction to subjective probability functions for hypothesis testing and estimation, the problem of determining optimal sample size, specific applications to the general linear model and associated analysis of variance techniques.

## Objectives

At the close of the session the participants were to be able to:

Objective 1: Read and evaluate the current literature on Bayesian methodology.

Objective 2: Apply general Bayesian principals in their studies.

Objective 3: Appreciate Bayesian philosophy and logic with special reference to inference.

Objective 4: Gain insights into classical statistics as a result of exposure to a competing philosophy and will be able to better teach statistics to others.

## Schedule

### Day I

Session 1: Introduction to Bayesian statistics, Philosophy, definitions of probability

Session 2: Basic probability axioms and theorems, Bayes' theorem, problem session

### Day II

Session 1: Comparison of classical and Bayesian approaches--relation of errors and losses

Session 2: One state and many states of nature, likelihood ratios, problem session

Day III

Session 1: Bayesian inference using Beta distribution, high density posterior probability intervals, natural conjugate Bayes densities

Session 2: Optimal sample size and loss functions, minimax rules, inadmissable rules, lab session

Day IV

Session 1: Problem session, normal sampling processes, inferences on means

Session 2: Analysis of linear models, inferences on both means and variances

Day V

Session 1: Miscellaneous questions, attitude survey, error rates in sample surveys

## Participants

Information from 31 participants revealed that 75 percent were male and 25 percent female. The average age for the group was 35 years. The majority of the participants (71 percent) were employed at a college or university. Three percent were from the public school systems, seven percent from the federal government, seven percent from state departments of education and 12 percent from other sources. Twenty-five percent had previously attended an AERA presession.

Academically, 61 percent possessed the doctorate and 32 percent possessed a master's degree. Seven percent held neither. As a group, they had an average of three articles published in scholarly journals and .7 funded project.

## Materials

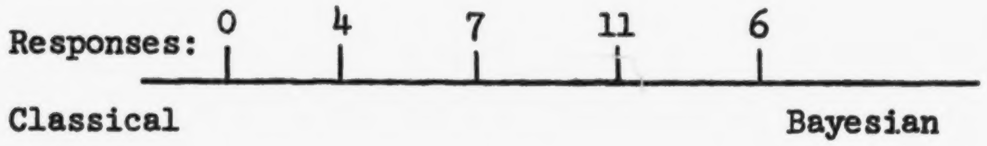
The materials used were xerox or ditto copies of Bracken's tables of beta function, tables of inverted gamma function, tables of binomial, and error rates in sampling designs. The students were also provided worksheets on optimal sample size.

## Evaluation

Test Results. An attitude survey was administered by the postsession staff on the last meeting of the session. The items were checked by the participants anonymously. A summary of the results are tabulated below:

## Attitude Survey

1. Are you more sympathetic to the "classical" approach or to the Bayesian approach to statistics? (Mark an X on the continuum below.)



2. Do you anticipate doing more study of Bayesian statistics?

   Definitely yes 21, probably 6, probably not 1, definitely no 0.

3. If you teach statistics or research methods, will you introduce some Bayesian concepts to your students?

   Definitely yes 11, probably 8, probably not 0, definitely no 0. I do not teach statistics 9.

4. Do you think that the addition of Bayesian statistics to your current statistical knowledge will aid you in your research work?

   Definitely yes 17, probably 9, probably not 0, definitely no 1. Omit 1.

5. Do you think you will apply Bayesian statistics or concepts in your research work?

   Definitely yes 16, probably 9, probably not 0, definitely no 1. Omit 1.

6. Do you think you have a better understanding of "classical" statistics as a result of the postsession?

   Definitely yes 18, probably 7, probably not 2, definitely no 1.

Two free-response questions asking for general reactions elicited the following comments:

| | | |
|---|---|---|
| a. | good presentation | 25 |
| b. | well-organized | 13 |
| c. | liked philosophical discussion contrasting Bayesian and classical approaches | 5 |
| d. | good coverage of material | 1 |
| e. | whetted appetite for more study | 2 |
| f. | more hand-out needed | 10 |
| g. | need more applications | 7 |
| h. | more problem sessions | 4 |
| i. | too much material in short time | 5 |
| j. | notation hard to follow | 3 |

| | | |
|---|---|---|
| k. | mathematical derivation difficult | 2 |
| l. | more class discussion | 1 |
| m. | too little philosophy | 1 |

Director's Evaluation. We were generally pleased with our post-session. The participants were eager to learn and enthusiastic about the subject matter. The facilities were satisfactory and conducive to learning.

The problem of heterogeneity of the group relative to background was evident, but did not impede progress significantly. However, it resulted in a less than optimal experience for all of the students. We have not yet resolved this problem.

From conversations with the participants it seems that the five-day session is about right since less time would result in too fast a pace and more time would result in over-saturation. An informal social gathering of all participants the second night would have benefited both the participants and AERA.

Participants' Anonymous Evaluations. On the final day of the session 27 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 56%, Good 40%, Average 0%, Fair 4%, Poor 0%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 100%, No 0%, Uncertain 0%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 81%, No 4%, Uncertain 15%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 89%, No 4%, Uncertain 7%.

# POSTSESSION IV: DESIGN AND ANALYSIS OF COMPARATIVE EXPERIMENTS

## Staff

| | |
|---|---|
| Kenneth Hopkins<br>(Co-Director) | University of Colorado<br>Boulder, Colorado |
| Jason Millman<br>(Co-Director) | Cornell University<br>Ithaca, New York |
| Donald T. Campbell | Northwestern University<br>Evanston, Illinois |

## General Description

Topics included in the session were sources of internal and external validity; the number, nature, role and complexity of variables used in experiments. Also included were the relation of statistical analyses to experimental designs; rules of thumb for the analysis of complex, but balanced experimental designs; the analysis of unbalanced designs or designs in which statistical assumptions are not met; quasi-experimental designs; the analysis of covariance; and the techniques of multiple and planned comparisons.

## Objectives

The general objective of the postsession was to increase the competence of educational researchers in matters of the design and analysis of comparative experiments. This objective was reflected behaviorally by the mastery tests, problem sets, and inventory which formed a part of the instructional materials.

Some of the cognitive objectives included promoting the participants' ability to:

Objective 1: Explain how randomization and blocking function to minimize bias and how blocking further results in increased precision.

Objective 2: Distinguish between the various purposes for and types of replication.

Objective 3: Graph and interpret various degrees of interaction.

Objective 4: Describe sources of internal and external experimental invalidity and designs which minimize their effect.

Objective 5: Interpret the threats to internal and external validity related to a given experiment.

Objective 6: State the assumptions underlying a given analysis and describe the effects of failure to meet a given assumption (e.g., heterogeneous variances, nonnormality, independence of measurements).

Objective 7: Identify the experimental unit involved in any experiment and compare to the unit of statistical analysis.

Objective 8: Identify appropriate analytic techniques for designs with disproportional cell frequencies.

Objective 9: Distinguish between main and nested classifications and between fixed, random, finite, and mixed models.

Objective 10: Interpret an ANOVA summary table and identify the design used.

Objective 11: Distinguish between planned and ex-post-facto comparisons and between experiment-wise and comparison-wise error rates; compute orthogonal contrasts, Newman-Keuls, Scheffé, and Tukey tests.

## Schedule

### Day I

Session 1: Types and functions of variables
Methods of variable control
Sources of internal invalidity, with emphasis on the regression effect
Session 2: Internal invalidity
Statistical interactions
Session 3: Sources of external invalidity

### Day II

Session 1: Causal inferences from nonexperimental data, noncorrelational techniques
Session 2: Causal inferences from nonexperimental data, correlational techniques
Session 3: General discussion, "experiments" in social settings

### Day III

Session 1: Introduction to classical analysis of variance model
Session 2: Rules of thumb for the analysis of complex, but balanced, experimental designs

Day IV

Session 1: Analysis of unbalanced designs or designs in which ANOVA assumptions are not met
Session 2: Violations of assumptions
Multiple and planned comparisons
Session 3: Elective activity

Day V

Session 1: Analysis of convariance
Participant attitude inventory

## Participants

Ninety-one percent of these participants were male and nine percent female. The average age was 37 years. Twenty-three percent of the group had previously attended AERA presessions.

Sixty-six percent were from a college or university and 13 percent from public school systems. Eight percent were from federal government positions, nine percent from state department of education, and four percent from other positions.

The percent of participants holding the doctorate was 71 while 25 percent held a master's degree and four percent held neither. The research productivity of the group was reflected in an average of two articles published in scholarly journals and .9 funded project per participant.

## Materials

Each participant was asked to bring Experimental and Quasi-Experimental Designs for Research by Donald T. Campbell and Julian C. Stanley (Rand-McNally, 1966). Upon arrival at the postsession site, each participant received a loose-leaf notebook which contained all the materials (demonstration and expository papers, problem sets, evaluation instruments, scrap paper) he needed. Included were several unpublished materials such as "The Design of Experiments" by Jason Millman, "General Linear Model: Lecture Notes" by Kenneth Hopkins, and "Problem Set on External Validity" by Glenn H. Bracht. Examples of some of the published materials used were: "Rules of Thumb for Writing the ANOVA Table" by Jason Millman and Gene V Glass, "Regression and the Matching Fallacy in Quasi-Experimental Research" by Kenneth Hopkins and "Reforms as Experiment" by Donald T. Campbell.

## Evaluation

Test Results. At regular intervals during the postsession, short quizzes were administered. The participants recorded their answers on a separate cover sheet which they handed in. They were then able to keep the test proper while the questions and answers were discussed by the instructional staff. These tests were not mastery examinations. Rather, they were composed of more difficult items which served as a learning experience.

Director's Evaluation. In addition to the observations of the directors, the two graduate assistants were individually interviewed for additional reactions. The following observations represent something of a consensus.

The postsession appears to have achieved its major objectives quite well, namely, to create an awareness of the more critical and recently developed concepts and techniques of experimental design and analysis as they are related to educational research. There were, however, aspects that did not develop as anticipated. There was widespread dissatisfaction with the contribution of one of the guests instructors who was directed to present techniques for "teasing out" causation from correlational data. Instead of giving the "main stream" approach as we had intended, he presented (in inordinate detail) his own work, a very narrow aspect of the general approach. He ignored the rather extensive guidelines given to him as well as suggested instructional materials.

There appeared to be a general feeling that participants need more time for follow-up study and completion of the problem sets which followed each major topic. It was suggested that by reducing the time given to guest instructors, more time could be allowed for this purpose.

The instructional facilities were very good--better than for the two previous presessions. The eating arrangements were only marginally adequate. Food quality and variety (no menu) was lacking. Many participants felt good quality was not commensurate with cost. The general assistance personnel at the Center was excellent.

The uncertainty of the $75 living allowance was most unfortunate. It is felt this reduced the number of participants by 15 to 20 percent. This factor also caused much extra work for the directors--answering letters and phone calls. The removal of the detail work regarding arrangements, etc., was a major improvement over previous years.

The semi-isolation from big city night life was a desirable feature of the site, although more facilities for recreational activity (ping pong, pool, etc.) in the evening would have provided some needed opportunity for a change-of-pace. The lack of facilities for after-dinner snacks, etc., was a common complaint.

Participants' Anonymous Evaluations. On the final day of the session 50 participants completed an anonymous evaluation form which was administered by and returned directly to the 1969 AERA Research Training Sessions Committee. Four items on that form pertained directly to the quality of the session. Responses to these questions follow: (1) Please rate the quality of instruction in your session. Excellent 64%, Good 32%, Average 2%, Fair 0%, Poor 2%. (2) Leaving aside the quality of instruction for the moment, do you think the topic treated in your session should be treated again next year? Yes 98%, No 2%, Uncertain 0%. (3) If you had it to do over again, would you apply for the session which you have just completed? Yes 92%, No 4%, Uncertain 4%. (4) If a session such as this is held again, would you recommend to others like you that they attend? Yes 94%, No 2%, Uncertain 4%.